cTEST

cTEST Controller
for CX100n Series
User's Manual

CONTEC CO.,LTD.

Check Your Package

Thank you for purchasing the CONTEC product.

The product consists of the items listed below.

Check, with the following list, that your package is complete.   If you discover damaged or missing items, contact your retailer.

If you use IPC-SLIB-01 (driver&utility software set), download it from the CONTEC's Web site.
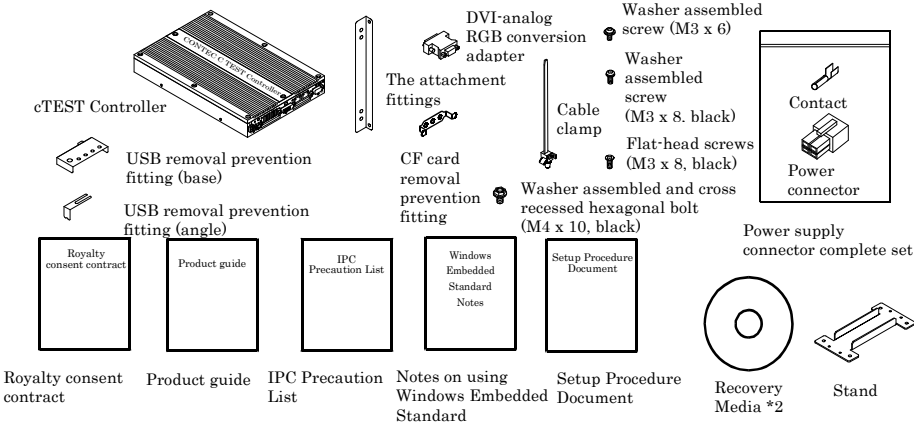
Product Configuration List

Name	CX-100n-DC5311-C02
	Pcs.
cTEST Controller	1
Stand	1
Flat-head screws (M3 x 8, black)	2
The attachment fittings	2
CF card removal prevention fitting	1 *1
USB removal prevention fitting (base)	1
USB removal prevention fitting (angle)	4
Washer assembled screw (M3 x 6)	4
Washer assembled screw (M3 x 8, black)	6
Washer assembled and cross recessed hexagonal bolt (M4 x 10, black)	4
Power supply connector complete set	
Power connector	1
Contact	4
Cable clamp	2
DVI-analog RGB conversion adapter	1
Product guide	1
IPC Precaution List	1
Royalty consent contract	1
Setup Procedure Document	1
Notes on using Windows Embedded Standard	1
Recovery Media *2	1

*1 It is attached to the main body.

*2 Please confirm latest information on the CONTEC homepage though the manual is stored in Recovery Media (\MANUAL).

Product Configuration Image

DVI-analog RGB conversion adapter

Washer assembled screw (M3 x 6)

Washer assembled screw (M3 x 8. black)

The attachment fittings

cTEST Controller

Cable clamp

Contact

USB removal prevention fitting (base)

CF card removal prevention fitting

Flat-head screws (M3 x 8, black)

Power connector

USB removal prevention fitting (angle)

Washer assembled and cross recessed hexagonal bolt (M4 x 10, black)

Power supply connector complete set

| Royalty consent contract | Product guide | IPC Precaution List | Notes on using Windows Embedded Standard | Setup Procedure Document | Recovery Media *2 | Stand |

* See the Product Configuration List to check if all the components are included for the specified number of units.

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1. Introduction

About the Product

This product is a multi-signal I/O computer for a Windows-based testing and measurement system. It provides advanced synchronization processing features along with the analog I/O, digital I/O, and counter input features equivalent to the CONTEC's measurement control boards AIO-163202F-PE, DIO-1616L-PE, and CNT-3204MT-LPE respectively, and is best for applications such as data collection from various sensors/devices and controlling them. Its Intel (R) Atom (TM) processor realizes low power consumption while securing sufficient performance, enabling a space-saving design so as to be installable in an area size of A4 size or less and a low height of 50 mm[1].

The "signal designer" in this product handles hardware processing and consolidated controls of events such as operation start/stop triggers and sampling clock of signal I/O features, realizing high-level synchronization processing that cannot be implemented in high-level language programming that utilizes commodity PC and one or more expansion boards.

*1 installed vertically

	CPU	Memory	Pre-install OS (storage)	I/O
CX-100n-DC5311-C02	Intel Atom Processor N270 (1.60GHz)	1GB	Windows Embedded Standard (Japanese), (4GB CF)	Have

Features

-   Cost Reduction of Testing Measurement System. Equipped with Measurement Control Devices. Features equivalent to three high-performance interface boards for measurement control are integrated to this size. This product alone is sufficient for performing of measurement control, such as voltage measurement and position control.

-   Analog I/O (equivalence to AIO-163202F-PE): 16bit Analog input 32channels, 16bit Analog output 2channels, etc
-   Digital I/O (equivalence to DIO-1616L-PE): 16channels Optocoupler isolated input, 16channels Optocoupler isolated open collector output
-   Counter input (equivalence to CNT-3204MT-LPE): 32bit A/B/Z-phase, Up down counter 4channels

-   The product has the hardware synchronization control feature called "Signal Designer" that ensures detection of test object characteristics.

The "signal designer" in this product handles hardware processing and consolidated controls of events such as operation start/stop triggers and sampling clock of signal I/O features. This enables high-level synchronization processing that cannot be implemented in high-level language programming that utilizes commodity PC and one or more expansion boards.
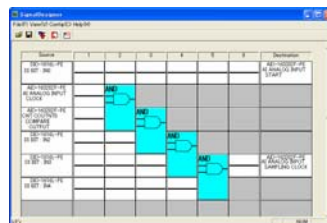
- Serving the downsizing of equipment, a small footprint design for A4-sized or smaller installation area

The product adopts space-saving design for A4-sized or smaller installation area 182(W) x 270(D) x 35(H), permitting placement with opening of only 50mm[*1].   It largely serves downsizing of your equipment, fits any area with the aestheticness kept.   The accompanying support stand allows vertical placement, consuming smaller footprint on your desk.   It is also possible to attach to the VESA standard 75 x 75, 100 x 100mm using the optional fittings.

*1 installed vertically

- Contributing to reduction of running cost and promotion of energy efficiency

It adopts the low-power platform with Intel (R) Atom(TM) Processor N270 1.60GHz (FSB 533MHz), 945GSE and ICH7M-DH chipset that realizes lower power consumption while ensuring sufficient performance.

- Slitless/fanless design that reduces maintenance work

It employs slitless/fanless designing achieved by the elimination of radiating slit and CPU fan.   It is free from dusts and foreign objects, and the use the parts that degrades over the years is avoided in most case, resulting in drastic alleviation of the maintenance burden.

- Remote power management function to reduce operation tasks

This product supports timed/automated system start-up (Resume By Alarm).   For example, it enables unattended operation, such as starting to show information of an establishment in unison at opening time. Also, it supports system start-up externally via network (Wake On LAN) and modem (Power On by Ring). It encourages significant labor saving in operation.

- Falling-off prevention tools and fixing clamps provided to avoid trouble caused by disconnected cable

This product stays trouble-free, being equipped with USB removal prevention fitting and cable clamp for connectors with no locking mechanism, such as USB cable, and with hardware to properly mount and avoid falling out of CF card.

- Major types of peripherals are supported with rich interfaces including the two CF card slots

It has a variety of extended interface such as 1000BASE-T x 2, USB2.0 x 4, serial (RS-232C x 2). It has 2 CF card slots that can use for OS and data.   They are very useful because you can use one slot for system start-up and the other for maintenance, system log, or taking away the collected data.

- Expandable with PCI boards and/or PCI Express boards

PC boards and PCI Express boards can be added by using, for example, a separately or optionally available cable and a PCI Express Cable-based expansion chassis.   It can be expanded with up to thirteen expansion board.

- Safety design required for embedded applications

Retention of CMOS data by EEPROM allows the system to start up even when the battery has run out. Additionally, Windows Embedded Standard installed model realizes totally spindleless design with CF card adopted for the storage. It can utilize EWF feature of OS[*2] that protects CF card from unnecessary write, i.e. relieves concern about the limitation of number of writes to CF card, and that prevents system from unintentional modification, as a result of consideration for reassurance in designing necessary for the purpose of embedding.

*2 EWF (Enhanced Write Filter) is a function specific to Windows Embedded Standard that protects the disk from being actually written by redirecting the writing to RAM.

- A wide range of power supplies (10.8 - 31.2VDC) supported

As the product supports a wide range of power (10.8 - 31.2VDC), it can be used in a variety of power environments.

Supported OS

- Windows Embedded Standard

Support Software

You should use CONTEC support software according to your purpose and development environment.

Windows version of analog I/O driver **API-AIO(WDM)**
  [Installed on the main body]

These drivers are the Windows version of analog I/O driver library software that provides products in the form of Win32 API functions (DLL).   Various sample programs such as Visual Basic and Visual C++, etc and diagnostic program useful for checking operation is provided.

Windows version of digital I/O driver **API-DIO(WDM)**
  [Installed on the main body]

These drivers are the Windows version of digital I/O driver library software that provides products in the form of Win32 API functions (DLL).   Various sample programs such as Visual Basic and Visual C++, etc and diagnostic program useful for checking operation is provided.

Windows version of counter driver **API-CNT(WDM)**
  [Installed on the main body]

These drivers are the Windows version of counter driver library software that provides products in the form of Win32 API functions (DLL).   Various sample programs such as Visual Basic and Visual C++, etc and diagnostic program useful for checking operation is provided.

< Operating environment >
OS   Windows Vista, XP, Server 2003, 2000
Adaptation language   Visual Basic, Visual C++, Visual C#, Delphi, C++ Builder
For more details on the supported OS, applicable language and how to download the updated version, please visit the CONTEC's Web site (http://www.contec.com/apipac/).

Signal Designer
  [Installed on the main body]

Signal Designer is a Windows setup utility whose GUI allows synchronization settings for CX-100n's analog I/O, digital I/O, and counter input features using the event controller.   Synchronization setting of signals used as event factors can be done easily, and also a mix of events can be created by combining them with logic operation (AND/OR/NOT).

< Operating environment >
OS   Windows XP Embedded (Japanese)

Customer Support

CONTEC provides the following support services for you to use CONTEC products more efficiently and comfortably.

Web Site

Japanese   http://www.contec.co.jp/
English   http://www.contec.com/
Chinese   http://www.contec.com.cn/

Latest product information

CONTEC provides up-to-date information on products.
CONTEC also provides product manuals and various technical documents in the PDF.

Free download

You can download updated driver software and differential files as well as sample programs available in several languages.

Note!   For product information

Contact your retailer if you have any technical question about a CONTEC product or need its price, delivery time, or estimate information.

Limited Three-Years Warranty

CONTEC products are warranted by CONTEC CO., LTD. to be free from defects in material and workmanship for up to three years from the date of purchase by the original purchaser.

Repair will be free of charge only when this device is returned freight prepaid with a copy of the original invoice and a Return Merchandise Authorization to the distributor or the CONTEC group office, from which it was purchased.

This warranty is not applicable for scratches or normal wear, but only for the electronic circuitry and original products.   The warranty is not applicable if the device has been tampered with or damaged through abuse, mistreatment, neglect, or unreasonable use, or if the original invoice is not included, in which case repairs will be considered beyond the warranty policy.

How to Obtain Service

For replacement or repair, return the device freight prepaid, with a copy of the original invoice.   Please obtain a Return Merchandise Authorization number (RMA) from the CONTEC group office where you purchased before returning any product.

* No product will be accepted by CONTEC group without the RMA number.

Liability

The obligation of the warrantor is solely to repair or replace the product.   In no event will the warrantor be liable for any incidental or consequential damages due to such defect or consequences that arise from inexperienced usage, misuse, or malfunction of this device.

Safety Precautions

Understand the following definitions and precautions to use the product safely.

Safety Information

This document provides safety information using the following symbols to prevent accidents resulting in injury or death and the destruction of equipment and resources.   Understand the meanings of these labels to operate the equipment safely.

⚠ DANGER	DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage.

Caution on the CX-100n Series

Handling Precautions

⚠ WARNING

- Always check that the power supply is turned off before connecting or disconnecting power cables.

- Do not modify the product.

- Always turn off the power before inserting or removing circuit boards or cables.

- This product is not intended for use in aerospace, space, nuclear power, medical equipment, or other applications that require a very high level of reliability.   Do not use the product in such applications.

- If using this product in applications where safety is critical such as in railways, automotive, or disaster prevention or security systems, please contact your retailer.

- Do not attempt to replace the battery as inappropriate battery replacement poses a risk of explosion.

- For battery replacement, contact your retailer as it must be performed as a process of repair.

- When disposing of a used battery, follow the disposal procedures stipulated under the relevant laws and municipal ordinances.

⚠ CAUTION

- Do not use or store this product in a location exposed to high or low temperature that exceeds range of specification or susceptible to rapid temperature changes.
  Example: - Exposure to direct sun
                   - In the vicinity of a heat source
- Do not use this product in extremely humid or dusty locations.   It is extremely dangerous to use this product with its interior penetrated by water or any other fluid or conductive dust.   If this product must be used in such an environment, install it on a dust-proof control panel, for example.
- Avoid using or storing this product in locations subject to shock or vibration that exceeds range of specification.
- Do not use this product in the vicinity of devices that generate strong magnetic force or noise.   Such products will cause this product to malfunction.
- Do not use or store this product in the presence of chemicals.
- To clean this product, wipe it gently with a soft cloth dampened with either water or mild detergent. Do not use chemicals or a volatile solvent, such as benzene or thinner, to prevent pealing or discoloration of the paint.
- This product's case may become hot.   To avoid being burned, do not touch that section while this product is in operation or immediately after turning off the power.   Avoid installation in a location where people may come into contact with that section.
- CONTEC does not provide any guarantee for the integrity of data on CF.
- Always disconnect the power cable from the receptacle before mounting or removing the expansion board, or before connecting or disconnecting any connector.
- To prevent corruption of files, always shutdown the OS before turning off this product.
- CONTEC reserves the right to refuse to service a product modified by the user.
- In the event of failure or abnormality (foul smells or excessive heat generation), unplug the power cord immediately and contact your retailer.
- To connect with peripherals, use a grounded, shielded cable.
- Before connecting/disconnecting CF, ensure that its power is turned off.
- Component Life:
  (1) Battery---The internal calendar clock and CMOS RAM are backed by a Lithium primary battery. The backup time at a temperature of 25°C with the power disconnected is 10 years or more.
  (2) CF---------OS-installed model uses a CF card in the OS storage area.   Estimated failure rates: 100,000 rewrite cycles, 1,000,000 hours MTBF
  * Replacement of expendables is handled as a repair (there will be a charge).

2. System Reference

Specification

Table 2.1.　Functional Specification < *1 / 2* >

Model		CX-100n-DC5311-C02
Model		Model with multi-signal I/O
CPU		Intel(R) Atom(TM) Processor N270 1.60GHz (FSB533MHz)
Chip set		Intel(R) 945GSE + ICH7M-DH
BIOS		BIOS (mfd. by Award)
Memory		1GB, 200pin SO-DIMM socket x 1, PC2-4300 (DDR2 533) DDR2 SDRAM support
Video	Controller	Built in Intel 945 GSE
	Video RAM	Main memory shared
	Video BIOS	64KB(C0000H-CFFFFH)
	Display I/F	DVI-I I/F x 1(29 pin connector x 1)
System resolution	DVI	640 x 480, 800 x 600, 1,024 x 768, 1,152 x 864, 1,280 x 600, 1,280 x 720, 1,280 x 768, 1,280 x 960, 1,280 x 1,024, 1,360 x 768, 1,400 x 1,050, 1,600 x 900, 1,600 x 1,200, 1,856 x 1,392, 1,920 x 1,080, 1,920 x 1,200 (16,770,000 colors)
	Analog RGB	640 x 480, 800 x 600, 1,024 x 768, 1,280 x 768, 1,280 x 1,024, 1,360 x 768, 1,400 x 1,050 (16,770,000 colors)
Audio		AC97 compliant LINE OUT: φ3.5 Stereo mini jack 　　　　　　　Full-scale output level 1.5Vrms (Typ.), Dual 50mW Amplifier MIC IN :　　φ3.5 Stereo mini jack 　　　　　　　Full-scale input level 1.3Vrms (Typ.)
Serial ATA I/F		None
CF card slot		CF CARD Type I x 2 bootable
		CF1 is finished mounting CF (4GB, 1 partition) *1
Serial I/F		RS-232C (general-purpose) : 2 channels (SERIAL PORT1, 2) 9pin D-SUB connector (male) Baud rate : 50 - 115,200bps
LAN	I/F	1000BASE-T/100BASE-TX/10BASE-T　RJ-45 connector x 2 (Wake On LAN support)
	Controller	Intel 82573L Controller

*1 :　The capacity of CF is a value when 1GB is calculated by 1 billion bytes.　The capacity that can be recognized from
　　　OS might be displayed fewer than an actual value.

Table 2.1.   Functional Specification < *2 / 2* >

Model		CX-100n-DC5311-C02
USB I/F		4 channels (USB 2.0-compliant)
Keyboard/mouse I/F		None *2
General-purpose I/O		None
RAS function		None
PCI Express cable		PCI Express 1.0a(x1) standard port (18-pin PCI Express External Cabling connector x 1)
Analog I/O equivalent to AIO-163202F-PE *3		Analog input : Single-end input 32channels, 16bit, 2μsec/ch (Max.) Analog output : 2channels, 16 bit, 10μsec (Max.) Digital I/O : 8channels for each, LVTTL Counter : 2channels, 32bit up count, 10MHz (Max.)
Digital I/O equivalent to DIO-1616L-PE *4		Digital input : 16channels Optocoupler isolated input 12 - 24VDC, corresponding to current sink output Digital output : 16channels Optocoupler isolated open collector output, current sink output
Counter input equivalent to CNT-3204MT-LPE *5		4channels, LVTTL, 32bit up down counter, 10MHz (Max.) 2-phase / single-phase / single-phase input with gate control
Hardware monitoring		Monitoring CPU temperature, board temperature, power voltage
Watch dog timer		Software programmable, 255 level (1sec - 255 sec) Causes a reset upon time-out.
RTC/CMOS		Lithium backup battery life : 10 years or more The real-time clock is accurate within ±3 minutes (at 25°C) per month (ICH7 integrated RTC).
Power Management		Power management setup via BIOS Power On by Ring / Wake On LAN Supports PC98/PC99 ACPI Power management
Power supply	Rated input voltage	12 - 24VDC *6
	Range of input voltage	10.8 - 31.2VDC
	Power consumption	12V 4.0A (Max.), 24V 2.0A (Max.)
	External device power supply capacity	- CF card slot +3.3V : 1A (500mA x 2) - USB I/F +5V : 2A (500mA x 4)
Physical dimensions (mm)		182 (W) x 270 (D) x 35(H) (No protrusions)
Weight		About 2.1kg

*2 : Use USB I/F for the keyboard / mouse.

*3 : For more details on this, refer to the manual for CONTEC's analog I/O board AIO-163202F-PE.

*4 : For more details on this, refer to the manual for CONTEC's digital I/O board DIO-1616L-PE.

*5 : For more details on this, refer to the manual for CONTEC's up down counter board CNT-3204MT-LPE.

*6 : Use a power cable shorter than 3m.

Table 2.2. Installation Environment Requirements

Model			CX-100n-DC5311-C02
Ambient specifications	Operating temperature *7		0 - 50°C *8
	Storage temperature		-10 - 60°C
	Humidity		10 - 90%RH (No condensation)
	Floating dust particles		Not to be excessive
	Corrosive gases		None
	Line-noise resistance	Line noise	AC line / ±2kV *9, Signal line / ±1kV (IEC61000-4-4 Level 3,EN61000-4-4 Level 3)
		Static electricity resistance	Contact discharge / ±4kV (IEC61000-4-2 Level 2, EN61000-4-2 Level 2) Atmospheric discharge / ±8kV (IEC61000-4-2 Level 3, EN61000-4-2 Level 3)
	Vibration resistance	Sweep resistance	10 - 57Hz / semi-amplitude 0.15 mm 57 - 150Hz/2.0G 40 min. each in x, y, and z directions (JIS C60068-2-6-compliant, IEC60068-2-6-compliant)
	Impact resistance		10G, half-sine shock for 11 ms in x, y, and z directions (JIS C60068-2-27-compliant, IEC60068-2-27-compliant)
	Grounding		Class D grounding (previous class 3 grounding), SG-FG / continuity

*7 ：For more details on this, please refer to chapter 3, "Installation Requirements".

*8 ：To use 1000BASE-T, you should keep its ambient temperature between 0 - 45°C.

*9 ：When AC/DC power unit "LDA100W-24-SN, LDA100W-12-SN" (by Cosel) is used.

Power Management Features

- Support both ACPI (Advanced Configuration and Power Interface) and legacy (APM) power management.

- ACPI v2.0 compliant

- APM v1.2 compliant

- PCI bus clock run, Power Management Enable (PME) control, all with hardware automatic wake-up

- Multiple suspends power plane controls and suspends status indicators

- Normal, doze, suspend and conserve modes

- Global and local device power control

Power Requirements

Your system requires a clean, steady power source for reliable performance of the high frequency CPU on the product, the quality of the power supply is even more important.   For the best performance makes sure your power supply provides a range of 10.8 V minimum to 31.2 V maximum DC power source.

Power Consumption

For typical configurations, the CPU card is designed to operate with at least a 60W power supply.   The power supply must meet the following requirements :

- Rise time for power supply: 2 ms - 30 ms

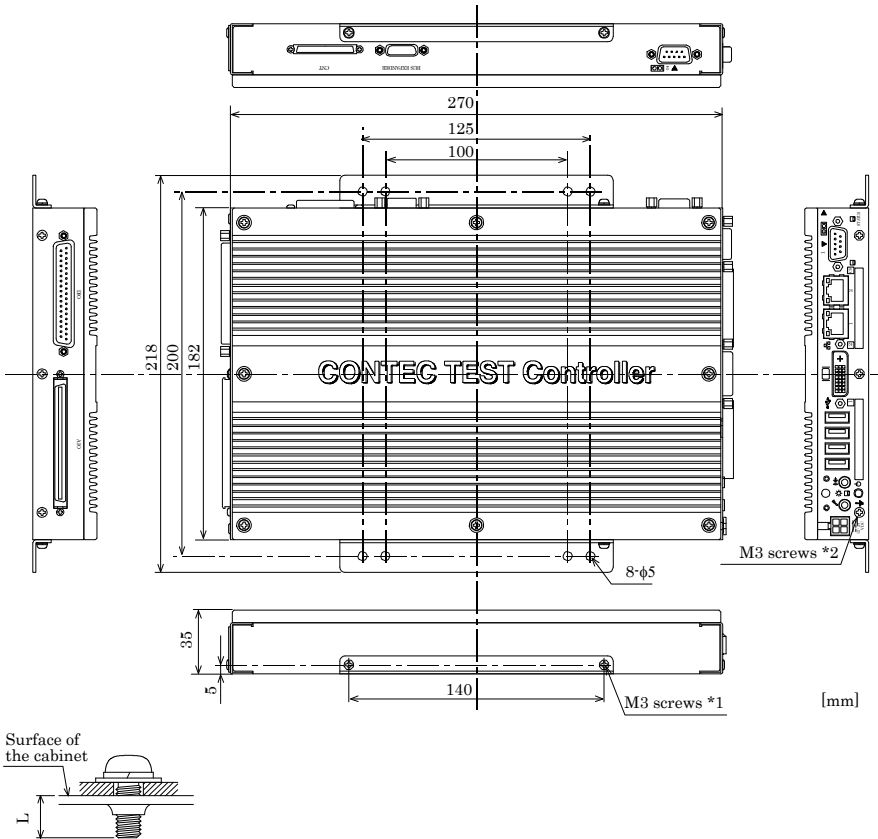The following table lists the power supply's tolerances for DC voltages:

Table 2.3.   DC voltage tolerance

DC Voltage	Acceptable Tolerance
+ 12V - 24V	+ 10.8V - 31.2V

Physical Dimensions

CX-100n-DC5311-C02

CONTEC TEST Controller

270
125
100
218
200
182
8-φ5
M3 screws *2
35
5
140
M3 screws *1
[mm]

Surface of the cabinet
L

*1 : When you fasten the bundled attachment fittings to be fixed to the body, you should use the attached screws (M3 x 8). Otherwise, the length (L) from the surface of the cabinet to the screw tip should be 6mm or less.

*2 : The length (L) from the surface of the cabinet to the screw tip should be 6mm or less.

Figure 2.1.   Physical Dimensions (Attaching the Attachment Fittings)
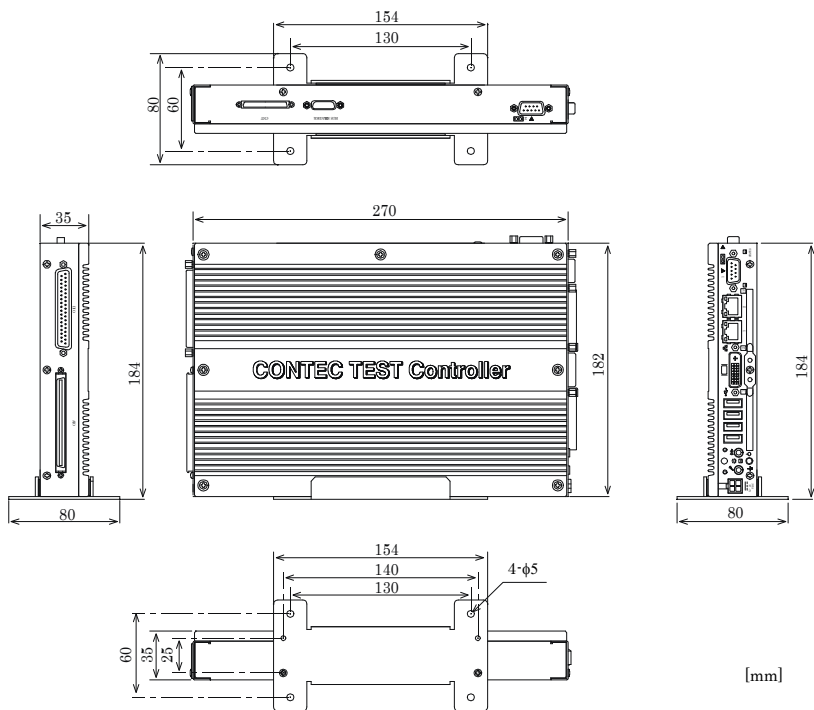
Figure 2.2.   Physical Dimensions (Attaching the Stand)

3. Hardware Setup

Before Using the Product for the First Time

Follow the next steps to set up this product :

STEP1   By referring to the information in this chapter, install, connect and set this product.

STEP2   Connect cables.
         Connect the cable of necessary external devices, such as keyboard and a display, to this
         product using appropriate cables.

STEP3   Turn on the power.
         After verifying that you have correctly followed steps 1 and 2, turn on the power.
         If you find any abnormality after turning on the power, turn it off and check to see if the
         setup has been performed properly.

STEP4   Set up BIOS.
         By referring to Chapter 5, set up BIOS.   This setup requires a keyboard and a display.

         * Before using this product, be sure to execute "LOAD SETUP DEFAULTS" to initialize
            the BIOS settings to their default values.
            (See Chapter 5, "Main Menu.")

⚠ CAUTION
    Be sure to connect the keyboard and mouse to it before turning the power on for the first time.
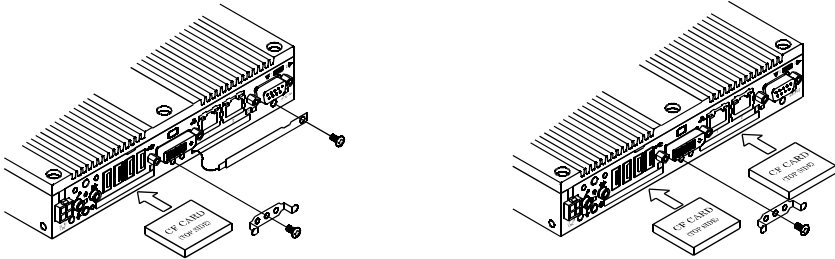
Hardware Setup

- Before you start, be sure that the power is turned off.
- Remove only those screws that are explained. Do not move any other screw.

Attaching the CF Attachment Fittings

(1) After inserting a CF Card, fasten the bundled CF attachment fittings with a screw.

Figure 3.1. Attaching the CF Attachment Fittings

⚠ CAUTION

- Insert the CF Card face up.

- Screw holes may be damaged if screws are tightened with a torque greater than the specified torque.The specified tightening torque is 3 - 3.5kgf·cm.

Attaching the Attachment Fittings

(1) Use screws to attach the bundled attachment fittings with a screw.
    Do not tighten screws with excess force.
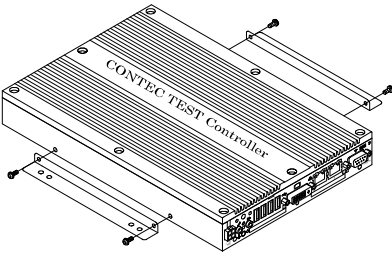
* Attached screw (M3 x 8)
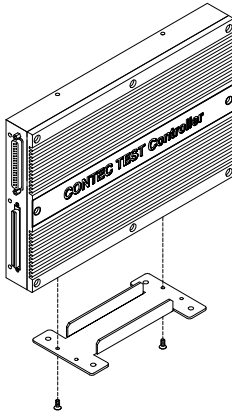
Figure 3.2. Attaching the Attachment Fittings

⚠ CAUTION

Screw holes may be damaged if screws are tightened with a torque greater than the specified torque.
The specified tightening torque is 5 - 6kgf·cm.

Attaching the Stand

(1) Use screws to attach the bundled screws.
Do not tighten screws with excess force.
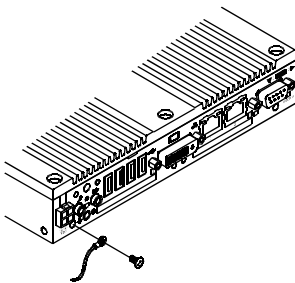
Figure 3.3.   Attaching the Stand

⚠ CAUTION

Screw holes may be damaged if screws are tightened with a torque greater than the specified torque.
The specified tightening torque is 5 - 6kgf·cm.

Attaching the FG

(1) Use screws to attach the FG.

*   Attached screw (M3 x 8)

Figure 3.4.   Attaching the FG

⚠ CAUTION

The FG pin of this product is connected to the GND signal of the DC power connector (DC-IN).
Note that the connection cannot be cut off.

Fastening the Cable

This product comes with clamps for fixing cables.

Fastening the LINEOUT, USB Cable

(1) The system unit has a hole for attaching cable clamp to USB removal prevention fitting.   Using a cable clamp for a cable with lock-less connector, such as the LINEOUT and USB Cable, prevents the connector from being unplugged.   Use the cable ties and cable clamps appropriately according to the connecting states and wiring directions of cables.
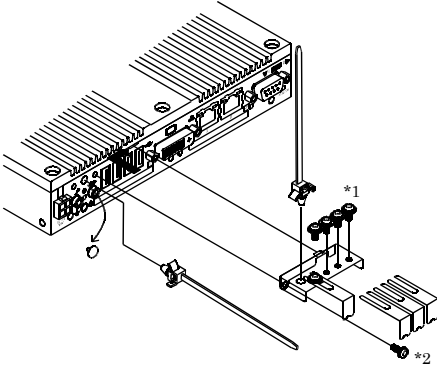
*1   Attached screw (M3 x 6)
*2   Attached screw (M3 x 8)

Figure 3.5.   Attaching the cable clamp

(2) The photo below shows an example of using a cable clamp.   Fix the cable with a clamp without applying stress to the connector.

Figure 3.6.   Using example of cable clamp

Installation Requirements

Be sure that the ambient temperature is within the range specified in the installation environment requirement by making space between the product and device that generates heat or exhaust air.
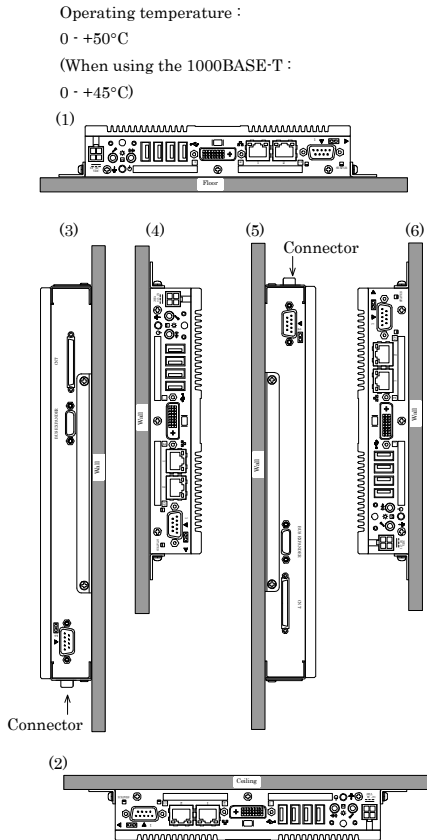
CX-100n-DC5311-C02

> Installable directions at operating temperature 0 - +50°C
> : All type of installation (including diagonal installation)

⚠ CAUTION
To use 1000BASE-T, you should keep its ambient temperature between 0 - 45°C

Operating temperature：

0 - +50°C

(When using the 1000BASE-T :
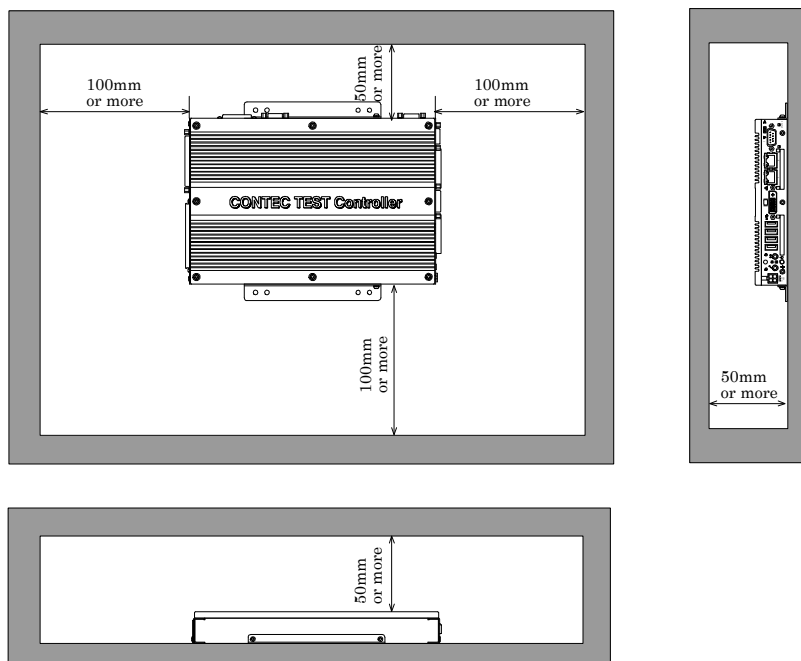
0 - +45°C)

Figure 3.7. Installation Orientation

⚠ CAUTION
Note that even though the ambient temperature is within the specified range, an operational malfunction may occur if there is other device generating high heat; the radiation will influence the product to increase its temperature.

Distances between this product and its vicinity

Figure 3.8.　Distances between this product and its vicinity

⚠ CAUTION
   Do not install this product into the fully-sealed space except the case in which the internal
   temperature is adjustable by equipment such as air conditioner.　Troubles such as operational
   malfunctions could be occurred by the temperature increase caused by long-term usage.
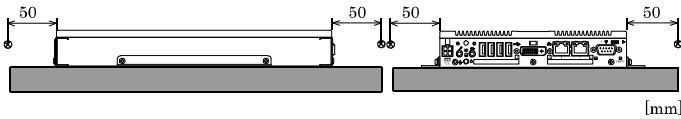
Ambient temperature

In this product, the ambient temperature is decided from the multiple measurement points as shown below. When making use of the product, the air current should be adjusted to prevent that all the temperatures measured at the measurement points exceed the specified temperature.

<Vertical installation>
⊗ measurement points

<Horizontal installation>

[mm]
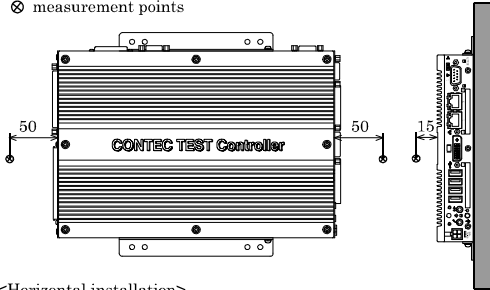
4. Each Component Function

Component Name
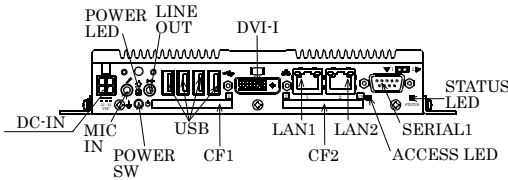
Front View

Figure 4.1. Component Name *< 1 / 3 >*
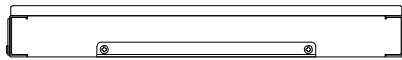
Side View
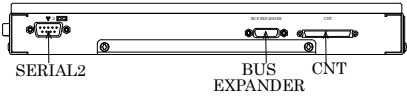
Left side   Right side

Figure 4.1. Component Name *< 2 / 3 >*

Back View
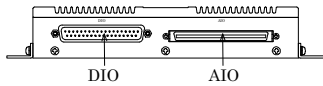
Figure 4.1. Component Name *< 3 / 3 >*

Table 4.1.   Component Function

Name	Function
POWER-SW	Power switch
POWER LED	Power ON display LED
ACCESS LED	IDE disk access display LED
STATUS LED	Status LED
DC-IN	DC power input connector
LINE OUT	Line out (φ3.5 PHONE JACK)
MIC IN	Mic in (φ3.5 PHONE JACK)
LAN1	Ethernet 1000BASE-T/100BASE-TX/10BASE-T RJ-45 connector
LAN2	Ethernet 1000BASE-T/100BASE-TX/10BASE-T RJ-45 connector
USB	USB port connector x 4
SERIAL1	Serial port 1 connector (9pin D-SUB/male)
SERIAL2	Serial port 2 connector (9pin D-SUB/male)
DVI-I	Display (29pin female)
CF1	CF card slot (IDE connection mastering)
CF2	CF card slot (IDE connection slaving)
BUS EXPANDER	PCI Express Cable connector (18pin PCI Express External Cabling/female)
AIO	Analog I/O connector (96pin half pitch connector/female)
DIO	Digital I/O connector (37pin D-SUB/male)
CNT	Counter connector (68pin 0.8mm pitch connector)

System Configuration
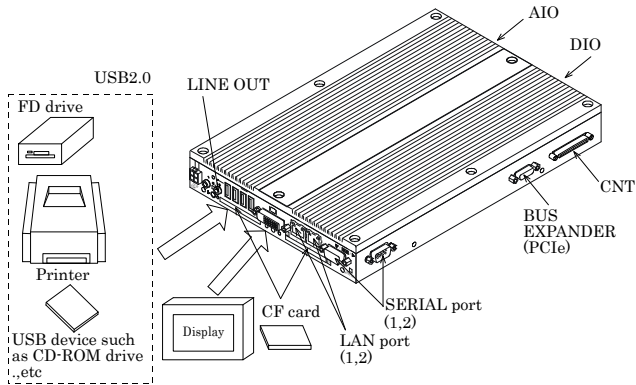
Figure 4.2.   System Configuration

Component Function

LED: POWER, ACCESS, STATUS

There are 3 LED in front of this product.

Table 4.2.   Display Contents of LED

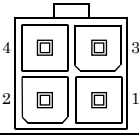| LED name	State	Display contents
POWER LED	OFF	Indicates that this product is switched off.
	ON (Green)	Indicates that this product is switched on.
ACCESS LED	ON (Orange)	Indicates that the IDE device is being accessed.
STATUS LED	OFF	You can control the behavior of LED from the user application. *1
	Flashing, ON (Red)	You can control the behavior of LED from the user application. *1
S-ATA LED	ON (Orange)	Indicates that the S-ATA device is being accessed.

*1   API that controls STATUS LED is available.   See the API description file "mtdll_e.chm" included in
/RasUtility/Samples in the CONTEC's Web site [IPC-SLIB-01] for details.

DC Power Input Connector : DC-IN

To supply the power, always use the power supply listed below.

Rated input voltage   : 12 - 24VDC
Range of input voltage   : 10.8 - 31.2VDC
Power capacity   : 12V 4.0A or more, 24V 2.0A or more
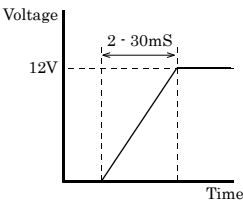
Table 4.3.   DC Power Connector

Connector type	9360-04P (mfd. by ALEX)	
	Pin No.	Signal name
	1	GND
	2	GND
	3	12 - 24V
	4	12 - 24V

Applicable connector on the connector side

Housing   : 9357-04 (mfd. by ALEX) or 5557-04R (mfd. by MOLEX)
Contact   : 4256T2-LF (AWG18-24) (mfd. by ALEX) or 5556 (AWG18-24) (mfd. by MOLEX)

Rise time of power supply

Figure 4.3.   Graph of Rise Time of Power Supply

POWER SW

POWER SW is provided.

Line out Interface : LINE OUT

A line output connector is provided.   You can plug a headphone or amplifier-integrated speakers into this connector.

MIC in Interface : MIC

A MIC input connector is provided.   You can plug a microphone to this connector for sound input.

Audio driver

The audio driver is required to use the microphone input and line output interfaces.

Install the appropriate audio driver for your OS from the CONTEC's Web site CD-ROM [IPC-SLIB-01]. (For information on the latest version of IPC-SLIB-01, check the CONTEC's Web site.)
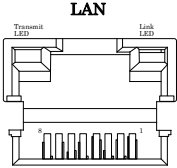
Giga bit-Ethernet : LAN 1 - 2

This product is equipped with 2 ports for giga bit.

- Network type   : 1000BASE-T/100BASE-TX/10BASE-T
- Transmission speed *   : 1000M/100M/10M bps
- Max. network path length   : 100m/segment
- Controller   : Intel 82573L

     * Operation at 1000Mbps requires a category 5e cable.

Table 4.4. Giga bit-Ethernet Connector

	Pin No.	Function	
		100BASE-TX	1000BASE-T
LAN Transmit LED / Link LED	1	TX+	TRD+(0)
	2	TX-	TRD-(0)
	3	RX+	TRD+(1)
	4	N.C.	TRD+(2)
	5	N.C.	TRD-(2)
	6	RX-	TRD-(1)
	7	N.C.	TRD+(3)
	8	N.C.	TRD-(3)

LEDs for display of network statuses:

Right LED	: Link LED
Normal connection	: Green ON, Operation : Green Blinking
Left LED	: Operation LED
10M : Off, 100M	: Green, 1000M : Orange

LAN drivers

Install the appropriate audio driver for your OS from the CONTEC's Web site [IPC-SLIB-01].
(For information on the latest version of IPC-SLIB-01, check the CONTEC's web site.)

⚠ CAUTION

     Attention should to be paid to the guaranteed operating range of temperature in using 1000BASE-T.
For more details on this, refer to chapter3, Installation Requirements.　Note that the Ethernet should
be configured as 100BASE-TX or 10BASE-T in using under the temperature 0 - 50°C.

USB Ports

This product is equipped with 4 channels for USB 2.0 interface.

Table 4.5. USB Connector

	Pin No.	Function
	1	USB_VCC
	2	USB-
	3	USB+
	4	USB_GND

Serial Port Interface : SERIAL1 - 2
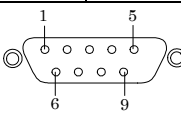
SERIAL1, 2 (RS-232C Ports)

The product has 2 channels of RS-232C compliant serial ports supporting up to a baud rate of 115,200bps with a 16-byte transmission-dedicated data buffer and a 16-byte reception-dedicated data buffer.   You can use "Chapter 5 BIOS Setup" to configure an I/O address, interrupt and unused state for each of the ports independently.   (The same I/O address and IRQ cannot be shared with any other device.)
Please refer to "Chapter 6 I/O Port Addresses" for more information on I/O address and register function.

Table 4.6.   SERIAL 1, 2 I/O Addresses and Interrupts

SERIAL	I/O address	Interrupt
1	3F8h - 3FFh	IRQ 4
2	2F8h - 2FFh	IRQ 3
T.P Port (system reserved) *1	2A0h - 2A7h	IRQ 5

*1   Set as Disable when shipped.   Not available since it is for the reserved device for the functional expansion in future.
The I/O address is fixed and can not be changed.

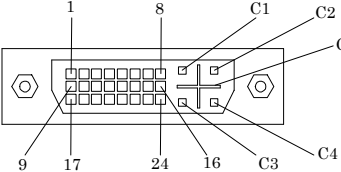**Table 4.7.   Serial Port Connector**

Connector used on the product	9-pin D-SUB (MALE)		

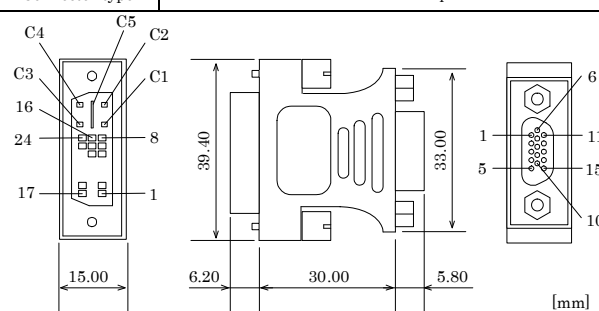| Pin No.	Signal name	Meaning	Direction
1	CD	Carrier detect	Input
2	RD	Received data	Input
3	TD	Transmitted data	Output
4	DTR	Data terminal ready	Output
5	GND	Signal ground	-----
6	DSR	Data set ready	Input
7	RTS	Request to send	Output
8	CTS	Clear to send	Input
9	RI	Ring indicator	Input

DVI Interface : DVI

A DVI interface is provided.   You can use it to connect a CRT (even a D-SUB 15 pin connector is acceptable by using the bundled DVI-analog RGB adapter) or a CONTEC Panel Link display.   The connector is named DVI (DVI-I 29-pin connector).

Table 4.8.   DVI Connector

Connector type	DVI-I 29 pin				
Pin No.	Signal name	Pin No.	Signal name	Pin No.	Signal name
1	DATA2-	13	N.C.	C1	RED
2	DATA2+	14	+5V	C2	GREEN
3	DATA2 SHIELD	15	GND	C3	BLUE
4	N.C.	16	HPD	C4	HSYNC
5	N.C.	17	DATA0-	C5	GND
6	DDC CLK	18	DATA0+		
7	DDC DATA	19	DATA0 SHIELD		
8	VSYNC	20	N.C.		
9	DATA1-	21	N.C.		
10	DATA1+	22	DATA0 SHIELD		
11	DATA1 SHIELD	23	CLK+		
2	N.C.	24	CLK-		

CX-100n User's manual

Table 4.9.   DVI-analog RGB conversion adapter

Connector type	DVI-I 29 pin		

15.00   6.20   30.00   5.80   [mm]

39.40   33.00

Signal on analog RGB			
Pin No.	Signal name	Pin No.	Signal name
1	RED	9	+5V
2	GREEN	10	GND
3	BLUE	11	N.C.
4	N.C.	12	DDC DATA
5	GND	13	HSYNC
6	GND	14	VSYNC
7	GND	15	DDC CLK
8	GND		

For the LCDs that can be connected, please refer to "Chapter 7 List of Options".

Display driver

Install the appropriate audio driver for your OS from the CONTEC's Web site [IPC-SLIB-01].
(For information on the latest version of IPC-SLIB-01, check the CONTEC's Web site.)

⚠ CAUTION
- You need to set the screen resolution if the display cable is not connected to this DVI-D interface at OS startup, but connected after OS startup (hereinafter referred to as "Late Insertion").   For more details on this, refer to the CONTEC's Web site [IPC-SLIB-01].
- You need to set the screen resolution against the analog interface.   For more details on the setting method, refer to the CONTEC's Web site [IPC-SLIB-01].
- When using the DVI interface, resolution 640 x 480 may not be displayed normally.   To display it normally, you need to set the screen resolution.   For more details on the setting method, refer to the CONTEC's Web site [IPC-SLIB-01].
- When the analog display is used, Windows MS-DOS may not be properly displayed in full-screen mode.
  This is because the frequency and resolution of Windows and MS-DOS (full-screen display) are the same due to the screen settings while the display parameters are different.
  For display, as only one parameter can be stored for one frequency or resolution, only either of Windows or MS-DOS screen can be displayed properly.
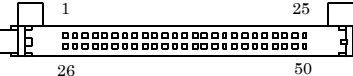 In this case, change the resolution or display frequency of Windows so that it is not the same as for the MS-DOS display.

CF Card Connector (Primary IDE Connection) : CF1 - 2

The CF Card (Type I : dedicated to the memory card) can be connected.
Before you insert/remove the CF card, make sure that the power is switched off and the access LED is turned off.

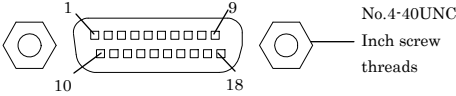**Table 4.10.   CF Card Connector**

Connector used on the product	50-socket header type (1.27mm pitch)				
		1 25 26 50			
Pin No.	Signal name	Direction	Pin No.	Signal name	Direction
1	GND		26	GND	
2	DD3	I/O	27	DD11	I/O
3	DD4	I/O	28	DD12	I/O
4	DD5	I/O	29	DD13	I/O
5	DD6	I/O	30	DD14	I/O
6	DD7	I/O	31	DD15	I/O
7	CS0-	Output	32	CD3-	Output
8	GND		33	GND	
9	GND		34	DIOR-	Output
10	GND		35	DIOW-	Output
11	GND		36	+3.3V	
12	GND		37	INTRQ	Input
13	+3.3V		38	+3.3V	
14	GND		39	CSEL-	Output
15	GND		40	N.C	
16	GND		41	RESET-	Output
17	GND		42	IOCHRDY	Input
18	DA2	Output	43	DDRQ	Input
19	DA1	Output	44	DDACK-	Output
20	DA0	Output	45	DACT-	Output
21	DD0	I/O	46	PDIAG-	Output
22	DD1	I/O	47	DD8	I/O
23	DD2	I/O	48	DD9	I/O
24	N.C		49	DD10	I/O
25	GND		50	GND	

◎CONTEC

BUS EXPANDER

This product is equipped with the PCI Express cable port.
You can use CONTEC's abundant measurement control boards by connecting with our PCI Express Cable-based expansion chassis and CB-CE-1 or CB-CE-3, the cable for Cable Express at extra cost.

Table 4.11.   PCI Express cable Connector

Connector type	18pin (FEMALE)				
	1 9 10 18			No.4-40UNC Inch screw threads	
Pin No.	Signal name	Function	Pin No.	Signal name	Function
1	Tx+	PCI Express transmitting line	10	GND	GND
2	Tx-		11	CPERST#	Reset signal
3	Reserved	None	12	N.C.	None
4	N.C.	None	13	CLK+	PCI Express clock
5	GND	GND	14	CLK-	
6	Reserved	None	15	N.C.	None
7	Reserved	None	16	N.C.	None
8	N.C.	None	17	RX+	PCI Express receiving line
9	GND	GND	18	RX-	

⚠ CAUTION

- PCI Express cable is 32-bit spec.   We have not verified operation on boards for both 64bit and 32bit, such as ADAPTEC's 39160SCSI board and Intel's Pro1000/MT network board.

- PCI Express bus is x1 spec.   Buses requiring baud rate more than x1 (x16, etc.) cannot be used.

- Leave "Reserved" pins unconnected.   Connecting these pins may cause a fault in this product.

AIO

CX-100n-DC5311-C02 features analog I/O.

This function is compatible with that of CONTEC's AIO-163202F-PE.

Pin Assignments of analog I/O connector < Single-Ended Input >

N.C.	B48		A48	Analog Output 00
N.C.	B47		A47	Analog Ground (for AO)
N.C.	B46		A46	Analog Output 01
N.C.	B45		A45	Analog Ground (for AO)
Analog Input 08	B44		A44	Analog Input 00
Analog Input 24	B43		A43	Analog Input 16
Analog Input 09	B42		A42	Analog Input 01
Analog Input 25	B41		A41	Analog Input 17
Analog Ground (for AI)	B40		A40	Analog Ground (for AI)
Analog Ground (for AI)	B39		A39	Analog Ground (for AI)
Analog Input 10	B38		A38	Analog Input 02
Analog Input 26	B37		A37	Analog Input 18
Analog Input 11	B36		A36	Analog Input 03
Analog Input 27	B35		A35	Analog Input 19
Analog Ground (for AI)	B34	B48 [49] [1] A48	A34	Analog Ground (for AI)
Analog Ground (for AI)	B33		A33	Analog Ground (for AI)
Analog Input 12	B32		A32	Analog Input 04
Analog Input 28	B31		A31	Analog Input 20
Analog Input 13	B30		A30	Analog Input 05
Analog Input 29	B29		A29	Analog Input 21
Analog Ground (for AI)	B28		A28	Analog Ground (for AI)
Analog Ground (for AI)	B27		A27	Analog Ground (for AI)
Analog Input 14	B26		A26	Analog Input 06
Analog Input 30	B25		A25	Analog Input 22
Analog Input 15	B24		A24	Analog Input 07
Analog Input 31	B23		A23	Analog Input 23
Analog Ground (for AI)	B22		A22	Analog Ground (for AI)
Analog Ground (for AI)	B21		A21	Analog Ground (for AI)
N.C.	B20		A20	N.C.
N.C.	B19		A19	N.C.
Digital Output 00	B18		A18	Digital Input 00
Digital Output 01	B17		A17	Digital Input 01
Digital Output 02	B16	B01 A01	A16	Digital Input 02
Digital Output 03	B15	[96] [48]	A15	Digital Input 03
Digital Output 04	B14		A14	Digital Input 04
Digital Output 05	B13		A13	Digital Input 05
Digital Output 06	B12		A12	Digital Input 06
Digital Output 07	B11		A11	Digital Input 07
AO Control Signal Output 00	B10		A10	AI Control Signal Output 00
AO Control Signal Output 01	B09		A09	AI Control Signal Output 01
Digital Ground	B08		A08	Digital Ground
AO External Sampling Clock Input	B07		A07	AI External Sampling Clock Input
AO External Stop Trigger Input	B06		A06	AI External Stop Trigger Input
AO External Start Trigger Input	B05		A05	AI External Start Trigger Input
Counter UP Clock Input 01	B04		A04	Counter UP Clock Input 00
Reserved	B03		A03	Reserved
Counter Gate Control Input 01	B02		A02	Counter Gate Control Input 00
Control Output 01	B01		A01	Counter Output 00

Connector used : 96pin half pitch connector [M (male) type]

PCR-96LMD [HONDA TSUSHIN KOGYO CO.,] or equivalence to it

Connector pin assignment is compatible with that of CONTEC's AIO-163202F-PE.

- The numbers in square brackets [ ] are pin numbers designated by HONDA TSUSHIN KOGYO CO.,

Analog Input00 - Analog Input31	Analog input signal. The numbers correspond to channel numbers.
Analog Output00 - Analog Output01	Analog output signal. The numbers correspond to channel numbers.
Analog Ground	Common analog ground for analog I/O signal.
AI External Start Trigger Input	External trigger input signal for starting analog input sampling.
AI External Stop Trigger Input	External trigger input signal for stopping analog input sampling.
AI External Sampling Clock Input	External sampling clock input signal for analog input.
AI Control Signal Output 00	External output signal for analog input sampling clock.
AI Control Signal Output 01	External output signal for analog input status. Now, it is unconnected.
AO External Start Trigger Input	External trigger input signal for starting analog output sampling.
AO External Stop Trigger Input	External trigger input signal for stopping analog output sampling.
AO External Sampling Clock Input	External sampling clock input signal for analog output.
AO Control Signal Output 00	External output signal for analog output sampling clock.
AO Control Signal Output 01	External output signal for analog output status. Now, it is unconnected.
Digital Input00 - Digital Input07	Digital input signal.
Digital Output00 - Digital Output07	Digital output signal.
Counter Gate Control Input00 - Counter Gate Control Input01	Counter gate control input signal.
Counter Up Clock Input00 - Counter Up Clock Input01	Counter up clock input signal.
Counter Output00 - Counter Output01	Count match output signal for counter.
Digital Ground	Common digital ground for digital I/O signal, external trigger input signal, external sampling clock input signal, counter I/O signal.
Reserved	This pin is reserved.
N.C.	This pin is left unconnected.

Figure 4.4.   Pin Assignments of analog I/O connector   < Single-Ended Input >

⚠ CAUTION

- Do not connect any of the outputs and power outputs to the analog or digital ground.
  Neither connect outputs to each other.   Doing either can result in a fault.

- If analog and digital ground are shorted together, noise on the digital signals may affect the analog signals.   Accordingly, analog and digital ground should be separated.

- Leave "Reserved" pins unconnected.   Connecting these pins may cause a fault in this product.

Pin Assignments of analog I/O connector < Differential Input >

N.C.	B48		A48	Analog Output 00
N.C.	B47		A47	Analog Ground (for AO)
N.C.	B46		A46	Analog Output 01
N.C.	B45		A45	Analog Ground (for AO)
Analog Input 08[+]	B44		A44	Analog Input 00[+]
Analog Input 08[-]	B43		A43	Analog Input 00[-]
Analog Input 09[+]	B42		A42	Analog Input 01[+]
Analog Input 09[-]	B41		A41	Analog Input 01[-]
Analog Ground (for AI)	B40		A40	Analog Ground (for AI)
Analog Ground (for AI)	B39		A39	Analog Ground (for AI)
Analog Input 10[+]	B38		A38	Analog Input 02[+]
Analog Input 10[-]	B37		A37	Analog Input 02[-]
Analog Input 11[+]	B36		A36	Analog Input 03[+]
Analog Input 11[-]	B35		A35	Analog Input 03[-]
Analog Ground (for AI)	B34		A34	Analog Ground (for AI)
Analog Ground (for AI)	B33	B48—[49] [1]—A48	A33	Analog Ground (for AI)
Analog Input 12[+]	B32		A32	Analog Input 04[+]
Analog Input 12[-]	B31		A31	Analog Input 04[-]
Analog Input 13[+]	B30		A30	Analog Input 05[+]
Analog Input 13[-]	B29		A29	Analog Input 05[-]
Analog Ground (for AI)	B28		A28	Analog Ground (for AI)
Analog Ground (for AI)	B27		A27	Analog Ground (for AI)
Analog Input 14[+]	B26		A26	Analog Input 06[+]
Analog Input 14[-]	B25		A25	Analog Input 06[-]
Analog Input 15[+]	B24		A24	Analog Input 07[+]
Analog Input 15[-]	B23		A23	Analog Input 07[-]
Analog Ground (for AI)	B22		A22	Analog Ground (for AI)
Analog Ground (for AI)	B21		A21	Analog Ground (for AI)
N.C.	B20		A20	N.C.
N.C.	B19		A19	N.C.
Digital Output 00	B18		A18	Digital Input 00
Digital Output 01	B17		A17	Digital Input 01
Digital Output 02	B16	B01—[96] [48]—A01	A16	Digital Input 02
Digital Output 03	B15		A15	Digital Input 03
Digital Output 04	B14		A14	Digital Input 04
Digital Output 05	B13		A13	Digital Input 05
Digital Output 06	B12		A12	Digital Input 06
Digital Output 07	B11		A11	Digital Input 07
AO Control Signal Output 00	B10		A10	AI Control Signal Output 00
AO Control Signal Output 01	B09		A09	AI Control Signal Output 01
Digital Ground	B08		A08	Digital Ground
AO External Sampling Clock Input	B07		A07	AI External Sampling Clock Input
AO External Stop Trigger Input	B06		A06	AI External Stop Trigger Input
AO External Start Trigger Input	B05		A05	AI External Start Trigger Input
Counter UP Clock Input 01	B04		A04	Counter UP Clock Input 00
Reserved	B03		A03	Reserved
Counter Gate Control Input 01	B02		A02	Counter Gate Control Input 00
Counter Output 01	B01		A01	Counter Output 00

Connector used ： 96pin half pitch connector [M (male) type]

PCR-96LMD [HONDA TSUSHIN KOGYO CO.,] or equivalence to it

Connector pin assignment is compatible with that of CONTEC's AIO-163202F-PE.

- The numbers in square brackets [ ] are pin numbers designated by HONDA TSUSHIN KOGYO CO.,

Analog Input00 - Analog Input15	Analog input signal. The numbers correspond to channel numbers.
Analog Output00 - Analog Output01	Analog output signal. The numbers correspond to channel numbers.
Analog Ground	Common analog ground for analog I/O signals.
AI External Start Trigger Input	External trigger input signal for starting analog input sampling.
AI External Stop Trigger Input	External trigger input signal for stopping analog input sampling.
AI External Sampling Clock Input	External sampling clock input signal for analog input.
AI Control Signal Output 00	External output signal for analog input sampling clock.
AI Control Signal Output 01	External output signal for analog input status. Now, it is unconnected.
AO External Start Trigger Input	External trigger input signal for starting analog output sampling.
AO External Stop Trigger Input	External trigger input signal for stopping analog output sampling.
AO External Sampling Clock Input	External sampling clock input signal for analog output.
AO Control Signal Output 00	External output signal for analog output sampling clock.
AO Control Signal Output 01	External output signal for analog output status. Now, it is unconnected.
Digital Input00 - Digital Input07	Digital input signal.
Digital Output00 - Digital Output07	Digital output signal.
Counter Gate Control Input00 - Counter Gate Control Input01	Counter gate control input signal.
Counter Up Clock Input00 - Counter Up Clock Input01	Counter up clock input signal.
Counter Output00 - Counter Output01	Count match output signal for counter.
Digital Ground	Common digital ground for digital I/O signal, external trigger input signal, external sampling clock input signal, counter I/O signal.
Reserved	This pin is reserved.
N.C.	This pin is left unconnected.

Figure 4.5.   Pin Assignments of analog I/O connector   < Differential Input >

⚠ CAUTION

- Do not connect any of the outputs and power outputs to the analog or digital ground.
  Neither connect outputs to each other.   Doing either can result in a fault.

- If analog and digital ground are shorted together, noise on the digital signals may affect the analog
  signals.   Accordingly, analog and digital ground should be separated.

- Leave "Reserved" pins unconnected.   Connecting these pins may cause a fault in this product.

DIO

CX-100n-DC5311-C02 features digital I/O.

This function is compatible with that of CONTEC's DIO-1616L-PE.

Pin Assignments of digital I/O connector

Common plus pin for +2/3 output port	OP 2/3	37		19	N.C.	
	O-37	36		18	IP 0/1	Common plus pin for +0/+1 input port
+3 port (Output)	O-36	35		17	I-17	+1 port (Input)
	O-35	34		16	I-16	
	O-34	33		15	I-15	
	O-33	32		14	I-14	
	O-32	31		13	I-13	
	O-31	30		12	I-12	
	O-30	29		11	I-11	
+2 port (Output)	O-27	28		10	I-10	+0 port (Input)
	O-26	27		9	I-07	
	O-25	26		8	I-06	
	O-24	25		7	I-05	
	O-23	24		6	I-04	
	O-22	23		5	I-03	
	O-21	22		4	I-02	
	O-20	21		3	I-01	
Common minus pin for +2/3 output port	ON 2/3	20		2	I-00	
				1	ON 2/3	Common minus pin for +2/3 output port

Connector used : 37pin D-SUB connector [F (Female) type]
DCLC-J37SAF-20L9E [mfd.by JAE] or equivalence to it

Connector pin assignment is compatible with that of CONTEC's DIO-1616L-PE.

I-00 - I-17	16 input signal pins. Connect output signals from the external device to these pins.
O20 - O37	16 output signal pins. Connect these pins to the input signal pins of the external device.
IP 0/1	Connect the positive side of the external power supply. These pins are common to 16 input signal pins.
OP 2/3	Connect the positive side of the external power supply. These pins are common to 16 output signal pins.
ON 2/3	Connect the negative side of the external power supply. These pins are common to 16 output signal pins.
N.C.	This pin is left unconnected.

Figure 4.6.   Pin Assignments of digital I/O connector

CNT

CX-100n-DC5311-C02 features counter.

This function is compatible with that of CONTEC's CNT-3204MT-LPE.

Pin Assignments of Counter Port Connector

CH0 Phase-A input	A0	1		35	GND	Ground
CH0 Phase-B input	B0	2		36	GND	Ground
CH0 Phase-Z input	Z0	3		37	GND	Ground
CH0 control input *1	DI0	4		38	GND	Ground
Unconnection	N.C.	5		39	N.C.	Unconnection
CH1 Phase-A input	A1	6		40	GND	Ground
CH1 Phase-B input	B1	7		41	GND	Ground
CH1 Phase-Z input	Z1	8		42	GND	Ground
CH1 control input *1	DI1	9		43	GND	Ground
Unconnection	N.C.	10		44	N.C.	Unconnection
CH2 Phase-A input	A2	11		45	GND	Ground
CH2 Phase-B input	B2	12		46	GND	Ground
CH2 Phase-Z input	Z2	13		47	GND	Ground
CH2 control input *1	DI2	14		48	GND	Ground
Unconnection	N.C.	15		49	N.C.	Unconnection
CH3 Phase-A input	A3	16		50	GND	Ground
CH3 Phase-B input	B3	17		51	GND	Ground
CH3 Phase-Z input	Z3	18		52	GND	Ground
CH3 control input *1	DI3	19		53	GND	Ground
Unconnection	N.C.	20		54	N.C.	Unconnection
Sampling clock input	CLKIN	21		55	GND	Ground
Sampling stop input	STOPIN	22		56	STARTIN	Sampling start input
Unconnection	N.C.	23		57	N.C.	Unconnection
Sampling clock output	CLKOUT	24		58	GND	Ground
Sampling stop output	STOPOUT	25		59	STARTOUT	Sampling start output
Unconnection	N.C.	26		60	N.C.	Unconnection
Test pulse Phase-A output	TPOA	27		61	TPOB	Test pulse Phase-B output
Unconnection	N.C.	28		62	N.C.	Unconnection
CH0 control output *2	DO0	29		63	DO1	CH1 control output *2
CH2 control output *2	DO2	30		64	DO3	CH3 control output *2
Unconnection	N.C.	31		65	N.C.	Unconnection
Counter input signal pull up	PUP1	32		66	PUP2	Control input signal pull up
Unconnection	N.C.	33		67	N.C.	Unconnection
+3.3V output *3	Vcc	34		68	Vcc	+3.3V output *3

Connector used： 68pin 0.8mm pitch connector

HDRA-E68LFDT+ [HONDA TSUSHIN KOGYO CO.,] or equivalence to it

Connector pin assignment is compatible with that of CONTEC's CNT-3204MT-LPE.

*1 The control input can serve as the general-input, counter start / stop, preset and zero-clear.

*2 The control output can serve as the general-output, count match, abnormal input error and digital filter error.

*3 Supply-capable current is 500mA (Max.).

Figure 4.7. Pin Assignments of Counter Port Connector

5. BIOS Setup

Introduction

This chapter discusses Award's Setup program built into the FLASH ROM BIOS.   The Setup program allows users to modify the basic system configuration.   This special information is then stored in battery-backed RAM so that it retains the Setup information when the power is turned off.

The rest of this chapter is intended to guide you through the process of configuring your system using Setup.

Starting Setup

The Award BIOS is immediately activated when you first power on the computer.   The BIOS reads the system information contained in the CMOS and begins the process of checking out the system and configuring it.   When it finishes, the BIOS will seek an operating system on one of the disks and then launch and turn control over to the operating system.

While the BIOS is in control, the Setup program can be activated in one of two ways:

1   By pressing <Del> immediately after switching the system on, or

2   By pressing the <Del> key when the following message appears briefly at the bottom of the screen during the POST (Power On Self-Test).

   Press DEL to enter SETUP.

If the message disappears before you respond and you still wish to enter Setup, restart the system to try again by turning it OFF then ON or pressing the "RESET" button on the system case.   You may also restart by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys.   If you do not press the keys at the correct time and the system does not boot, an error message will be displayed and you will again be asked to.

   Press F1 to continue, DEL to enter SETUP

Using Setup

In general, you use the arrow keys to highlight items, press <Enter> to select, use the PageUp and PageDown keys to change entries, press <F1> for help and press <Esc> to quit.   The following table provides more detail about how to navigate in the Setup program using the keyboard.

Table 5.1.   Using Setup

Key	Function
Up Arrow	Move to the previous item
Down Arrow	Move to the next item
Left Arrow	Move to the item on the left (menu bar)
Right Arrow	Move to the item on the right (menu bar)
Esc	Main Menu: Quit without saving changes Submenus: Exit Current page to the next higher level menu
Move Enter	Move to the item you desired
PgUp key	Increase the numeric value or make changes
PgDn key	Decrease the numeric value or make changes
+ key	Increase the numeric value or make changes
- key	Decrease the numeric value or make changes
Esc key	Main Menu -- Quit and not save changes into CMOS Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu
F1 key	General help on Setup navigation keys
F5 key	Load previous values from CMOS
F6 key	Load the fail-safe defaults from BIOS default table
F7 key	Load the optimized defaults
F10 key	Save all the CMOS changes and exit

Getting Help

Press F1 to pop up a small help window that describes the appropriate keys to use and the possible selections for the highlighted item.   To exit the Help Window press <Esc> or the F1 key again.

In Case of Problems

If, after making and saving system changes with Setup, you discover that your computer no longer is able to boot, the AwardBIOS™ supports an override to the CMOS settings which resets your system to its defaults.

The best advice is to only alter settings which you thoroughly understand.   To this end, we strongly recommend that you avoid making any changes to the chipset defaults.   These defaults have been carefully chosen by both Award and your systems manufacturer to provide the absolute maximum performance and reliability.   Even a seemingly small change to the chipset setup has the potential for causing you to use the override.

A Final Note About Setup

The information in this chapter is subject to change without notice.

Main Menu

Once you enter the Award BIOS CMOS Setup Utility, the Main Menu will appear on the screen.   The Main Menu allows you to select from several setup functions and two exit choices.   Use the arrow keys to select among the items and press <Enter> to accept and enter the sub-menu.

Note that a brief description of each highlighted selection appears at the bottom of the screen.

```
            Phoenix - AwardBIOS CMOS Setup Utitily

  ▶  Standard CMOS Features        ▶  Frequency/Voltage Control

  ▶  Advanced BIOS Features           Load Fail Safe Defualts

  ▶  Advanced Chipset Features        Load Optimized Defaults

  ▶  Integrated Peripherals           Set Supervisor Password

  ▶  Power Management Setup           Set Use Password

  ▶  PnP/PCI Configurations           Save & Exit Setup

  ▶  Health Status                    Exit Without Saving

  Esc : Quit                    ↑↓→←     : Select Item

  F10 : Save & Exit Setup

  F6  : SAVE CMOS TO BIOS           F7  : LOAD CMOS FROM BIOS

               Time, Date, Hard Disk Type ...
```

Figure 5.1.   Main Manu

Setup Items

The main menu includes the following main setup categories.   Recall that some systems may not include all entries.

Standard CMOS Features

Use this menu for basic system configuration.

Advanced BIOS Features

Use this menu to set the Advanced Features available on your system.

Advanced Chipset Features

Use this menu to change the values in the chipset registers and optimize your system's performance.

Integrated Peripherals

Use this menu to specify your settings for integrated peripherals.

Power Management Setup

Use this menu to specify your settings for power management.

PnP / PCI Configuration

This entry appears if your system supports PnP / PCI.

Load Fail-Safe Defaults

Use this menu to load the BIOS default values for the minimal/stable performance for your system to operate.

Load Optimized Defaults

Use this menu to load the BIOS default values that are factory settings for optimal performance system operations.   While Award has designed the custom BIOS to maximize performance, the factory has the right to change these defaults to meet their needs.

Supervisor / User Password

Use this menu to set User and Supervisor Passwords.

Save & Exit Setup

Save CMOS value changes to CMOS and exit setup.

Exit Without Save

Abandon all CMOS value changes and exit setup.

Standard CMOS Setup

```
                 Phoenix - AwardBIOS  CMOS  Setup  Utility
                          Standard  CMOS  Features

    Date  (mm:dd:yy)           Wed,  Jul  18  2007          Item  Help
    Time  (hh:mm:ss)           14 : 27 : 10

 ▶  IDE Channel 0 Master       [ None]               Menu Level ▶
 ▶  IDE Channel 0 Slave        [ None]                  Change the day, month,
                                                        year  and century


    Video                      [ EGA/VGA]
    Halt  On                   [All , But Keyboard]

    Base  Memory                     640K
    Extended  Memory              514048K
    Total  Memory                 515072K


 ↑↓→← :Move    Enter:Select    +/-/PU/PD:Value   F10:Save    ESC:Exit    F1:General Help
    F5:  Previous Values        F6: Fail-Safe  Defaults      F7:  Optimized  Defaults
```

Figure 5.2. Standard CMOS Setup

The items in Standard CMOS Setup Menu are divided into 10 categories.   Each category includes no, one or more than one setup items.   Use the arrow keys to highlight the item and then use the <PgUp> or <PgDn> keys to select the value you want in each item.

Main Menu Selections

This table shows the selections that you can make on the Main Menu.

Table 5.2.   Main Menu Selections

Item	Options	Description
Date	Month DD YYYY	Set the system date. Note that the 'Day' automatically changes when you set the date
Time	HH : MM : SS	Set the system time
IDE Channel 0 Master	Options are in its sub menu	Press <Enter> to enter the sub menu of detailed options
IDE Channel 0 Slave	Options are in its sub menu	Press <Enter> to enter the sub menu of detailed options
Video	EGA/VGA CGA 40 CGA 80 MONO	Select the default video device
Halt On	All Errors No Errors All, but Keyboard	Select the situation in which you want the BIOS to stop the POST process and notify you
Base Memory	N/A	Displays the amount of conventional memory detected during boot up
Extended Memory	N/A	Displays the amount of extended memory detected during boot up
Total Memory	N/A	Displays the total memory available in the system

IDE Adapters

The IDE adapters control the CF card.   Use a separate sub menu to configure each CF card.

Use the legend keys to navigate through this menu and exit to the main menu.   Use Table 5.3 to configure the hard disk.

Table 5.3.   IDE Adapters configurations

Item	Options	Description
IDE HDD Auto-detection	Press Enter	Press Enter to auto-detect the CF card on this channel. If detection is successful, it fills the remaining fields on this menu.
IDE Channel 0/2 Master/Slave	None Auto Manual	Selecting 'manual' lets you set the re-maining fields on this screen. Selects the type of fixed disk. "User Type" will let you select the number of cylinders, heads, etc. Note: PRECOMP=65535 means NONE !
Capacity	Auto Display your CF card size	Disk drive capacity (Approximated). Note that this size is usually slightly greater than the size of a formatted disk given by a disk checking program.
Access Mode	CHS LBA Large Auto	Choose the access mode for this CF card.
The following options are selectable only if the 'IDE Channel 0/2 Master/Slave' item is set to 'Manual'		
Cylinder	Min = 0 Max = 65535	Set the number of cylinders for this CF card.
Head	Min = 0 Max = 255	Set the number of heads for this CF card.
Precomp	Min = 0 Max = 65535	**** **Warning** : Setting a value of 65535 means no CF card
Landing zone	Min = 0 Max = 65535	****
Sector	Min = 0 Max = 255	Number of sectors per track

Advanced BIOS Features Setup

This section allows you to configure your system for basic operation.   You have the opportunity to select the system's default speed, boot-up sequence, keyboard operation, shadowing and security.

		Item Help
CPU Feature	[Press Enter]	
Hard Disk Boot Priority	[Press Enter]	
Virus Warning	[Disabled]	
CPU L1 & L2 Cache	[Enabled]	
Hyper-Threading Technology	[Enabled]	
Quick Power On Self Test	[Enabled]	
USB Device Wait	[Disabled]	
First Boot Device	[USB-FDD]	
Second Boot Device	[USB-CDROM]	
Third Boot Device	[Hard Disk]	
Boot Other Device	[Enabled]	
Boot Up Numlock Status	[On]	
Gate A20 Option	[Fast]	
Typematic Rate Setting	[Disabled]	
Typematic Rate (Chars/Sec)	6	
Typematic Delay (Msec)	250	
Security Option	[Setup]	
APIC Mode	Enabled	
MPS Version Control For OS	[1.4]	
OS Select For DRAM > 64MB	[Non-OS2]	

Figure 5.3.   Advanced BIOS Features Setup

CPU Feature

```
        Phoenix - AwardBIOS CMOS Setup Utility
                    CPU Feature
┌─────────────────────────────────────┬──────────────────────┐
│  Delay Prior to Thermal   [16 Min]   │      Item Help       │
│  C1E Function             [Auto]     │                      │
│  Execute Disable Bit      [Enabled]  │   Menu Level ▶       │
│                                      │                      │
│                                      │                      │
│                                      │                      │
│                                      │                      │
│                                      │                      │
│                                      │                      │
│                                      │                      │
└─────────────────────────────────────┴──────────────────────┘
  ↑↓→← :Move    Enter:Select   +/-/PU/PD:Value   F10:Save   ESC:Exit   F1:General Help
    F5: Previous Values        F6: Fail-Safe Defaults      F7: Optimized Defaults
```

Figure 5.4.   CPU Feature

Press <Enter> to configure the settings relevant to CPU Feature.

Table 5.4.   CPU Features Selections

Description	Choice
Delay Prior to Thermal Select the interval to setup the delay timer for CPU Thermal-Throuttling	Delay Prior to Thermal 4 Min .....[ ] 8 Min .....[ ] 16 Min .....[▮] 32 Min .....[ ] ↑↓ :Move ENTER:Accept ESC:Abort
C1E Function CPU C1E Function Select.	C1E Function Auto .....[▮] Disabled .....[ ] ↑↓ :Move ENTER:Accept ESC:Abort

Description	Choice
Execute Disable Bit When disabled, forces the XD feature flag to always return 0.	Execute Disable Bit Enabled ..... [■] Disabled ..... [ ] ↑↓ :Move ENTER:Accept ESC:Abort

Hard Disk Boot Priority

Phoenix - AwardBIOS CMOS Setup Utility
Hard Disk Boot Priority

1. Bootable Add-in Cards	Item Help
	Menu Level ▶ Use < ↑ > or < ↓ > to select a device , then press < + > to move it up , or < - > to move it down the list . Press <ESC> to exit this menu.

↑↓→← :Move   Enter:Select   +/-/PU/PD:Value   F10:Save   ESC:Exit   F1:General Help
F5: Previous Values   F6: Fail-Safe Defaults   F7: Optimized Defaults

Figure 5.5. Hard Disk Boot Priority

With the field, there is the option to choose, aside from the hard disks connected, "Bootable add-in Cards" which refers to other external device.

Virus Warning

When enabled, you receive a warning message if a program (specifically, a virus) attempts to write to the boot sector or the partition table of the hard disk drive.   You should then run an anti-virus program. Keep in mind that this feature protects only the boot sector, not the entire hard drive.

⚠ CAUTION

Many disk diagnostic programs that access the boot sector table can trigger the virus warning message.   If you plan to run such a program, we recommend that you first disable the virus warning.

Enabled	Activates automatically when the system boots up causing a warning message to appear when any-thing attempts to access the boot sector or hard disk partition table.
Disabled	No warning message will appear when anything attempts to access the boot sector or hard disk partition table.

Table 5.5.   Advance BIOS Feature Selections

Description	Choice
CPU L1 & L2 Cache These allow you to enable (speed up memory access) or disable the cache function.	CPU L1 & L2 Cache Disabled ..... [ ] Enabled ..... [▮] ↑↓:Move ENTER:Accept ESC:Abort
Hyper-Threading Technology These allow you to enable or disable the Hyper-Threading function.	Hyper-Threading Technology Disabled ..... [ ] Enabled ..... [▮] ↑↓:Move ENTER:Accept ESC:Abort

Description	Choice
Quick Power On Self Test Select Enabled to reduce the amount of time required to run the power-on self-test (POST). A quick POST skips certain steps. We recommend that you normally disable quick POST. Better to find a problem during POST than lose data during your work	Quick Power On Self Test Disabled . . . . . [ ] Enabled . . . . . [▌] ↑↓:Move ENTER:Accept ESC:Abort
USB Device Wait When USB devices, which need longer time to be booted, are connected, the boot possibly can not be processed in normal condition. To address such cases, this setting specifies the waiting time for BIOS and delays the start of the access to the USB devices. Therefore, the boot will be delayed by the specified waiting time.	USB Device Wait Disabled . . . . . [▌] 5 Sec . . . . . [ ] 10 Sec . . . . . [ ] 20 Sec . . . . . [ ] 30 Sec . . . . . [ ] 60 Sec . . . . . [ ] ↑↓:Move ENTER:Accept ESC:Abort
First Boot Device The BIOS attempts to load the operating system from the devices in the sequence selected in these items.	First Boot Device LS120 . . . . . [ ] Hard Disk . . . . . [ ] CDROM . . . . . [ ] ZIP100 . . . . . [ ] USB-FDD . . . . . [▌] USB-ZIP . . . . . [ ] USB-CDROM . . . . . [ ] LAN . . . . . [ ] Disabled . . . . . [ ] ↑↓:Move ENTER:Accept ESC:Abort

Description	Choice
Second Boot Device The BIOS attempts to load the operating system from the devices in the sequence selected in these items.	Second Boot Device LS120 . . . . . [ ] Hard Disk . . . . . [ ] CDROM . . . . . [ ] ZIP100 . . . . . [ ] USB-FDD . . . . . [ ] USB-ZIP . . . . . [ ] USB-CDROM . . . . [▌] LAN . . . . . [ ] Disabled . . . . . [ ] ↑↓ :Move ENTER:Accept ESC:Abort
Third Boot Device The BIOS attempts to load the operating system from the devices in the sequence selected in these items.	Third Boot Device LS120 . . . . . [ ] Hard Disk . . . . [▌] CDROM . . . . . [ ] ZIP100 . . . . . [ ] USB-FDD . . . . . [ ] USB-ZIP . . . . . [ ] USB-CDROM . . . . . [ ] LAN . . . . . [ ] Disabled . . . . . [ ] ↑↓:Move ENTER:Accept ESC:Abort
Boot Other Device The BIOS attempts to load the operating system from the devices in the sequence selected in these items.	Boot Other Device Disabled . . . . . [ ] Enabled . . . . . [▌] ↑↓:Move ENTER:Accept ESC:Abort
Boot Up NumLock Status Toggle between On or Off to control the state of the NumLock key when the system boots. When toggled On, the numeric keypad generates numbers instead of controlling cursor operations.	Boot Up NumLock Status Off . . . . . [ ] On . . . . . [▌] ↑↓:Move ENTER:Accept ESC:Abort

Description	Choice
Gate A20 option Gate A20 refers to the way the system addresses memory above 1 MB (extended memory). When set to Fast, the system chipset controls Gate A20. When set to Normal, a pin in the keyboard controller controls Gate A20. Setting Gate A20 to Fast improves system speed, particularly with OS/2 and Windows	Gate A20 Option Normal . . . . . [ ] Fast . . . . . [▌] ↑↓:Move ENTER:Accept ESC:Abort
Typematic Rate Setting When Disabled, the following two items (Typematic Rate and Typematic Delay) are irrelevant. Keystrokes repeat at a rate determined by the keyboard controller in your system. When Enabled, you can select a typematic rate and typematic delay.	Typematic Rate Setting Disabled. . . . . [▌] Enabled . . . . . [ ] ↑↓:Move ENTER:Accept ESC:Abort
Typematic Rate (Chars/Sec) When the typematic rate setting is enabled, you can select a typematic rate (the rate at which character repeats when you hold down a key) of 6, 8, 10, 12, 15, 20, 24 or 30 characters per second.	Typematic Rate (Chars/Sec) 6 . . . . . [▌] 8 . . . . . [ ] 10 . . . . . [ ] 12 . . . . . [ ] 15 . . . . . [ ] 20 . . . . . [ ] 24 . . . . . [ ] 30 . . . . . [ ] ↑↓:Move ENTER:Accept ESC:Abort
Typematic Delay (Msec) When the speed setting for the key input is enabled, you can specify the interval of waiting time for the continuous key input.	Typematic Delay (Msec) 250 . . . . . [▌] 500 . . . . . [ ] 750 . . . . . [ ] 1000 . . . . . [ ] ↑↓:Move ENTER:Accept ESC:Abort

Description	Choice
Security Option Select whether the password is required every time the system boots or only when you enter setup. If you have set a password, select whether the password is required every time the System boots, or only when you enter Setup. System: The system will not boot and access to Setup will be denied if the correct password is not entered at the prompt. Setup: The system will boot, but access to Setup will be denied if the correct password is not entered at the prompt.	Security Option Setup ..... [▮] System ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort
Note: To disable security, select PASSWORD SETTING at Main Menu and then you will be asked to enter password. Do not type anything and just press <Enter>, it will disable security. Once the security is disabled, the system will boot and you can enter Setup freely.	
APIC Mode APIC stands for Advanced Programmable Interrupt Controller. Note : This item is show only	APIC Mode Enabled ..... [▮] ↑↓:Move ENTER:Accept ESC:Abort
MPS Version Control For OS Use the Multiprocessor Specification (MPS) for OS option to specify the MPS version to be used. MPS version 1.4 added extended configuration tables to improve support for multiple PCI bus configurations and improve future expandability.	MPS Version Control For OS 1.1 ..... [ ] 1.4 ..... [▮] ↑↓:Move ENTER:Accept ESC:Abort
OS Select For DRAM > 64M Select the operating system that is running with greater than 64MB of RAM on the system.	OS Select For DRAM > 64M Non-OS2 ..... [▮] OS2 ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort

Advanced Chipset Features Setup

```
        Phoenix - AwardBIOS CMOS Setup Utility
             Advanced Chipset Features

    DRAM Timing Selectable    [By SPD]         ┌──────────────────┐
  x  CAS Latency Time          Auto            │    Item Help     │
  x  DRAM RAS# to CAS# Delay   Auto            │                  │
  x  DRAM RAS# Precharge       Auto            │  Menu Level ▶    │
  x  Precharge delay (tRAS)    Auto            │                  │
  x  System Memory Frequency   Auto            │                  │
     SLP_S4# Assertion Width   [1 to 2 Sec.]   │                  │
     System BIOS Cacheable     [Enabled]       │                  │
     Video BIOS Cacheable      [Disabled]      │                  │
     Memory Hole At 15-16M     [Disabled]      │                  │
  ▶  PCI Express Root Port Func [Press Enter]  │                  │
                                               │                  │
     **   VGA Setting   **                     │                  │
                                               │                  │
     On-Chip Frame Buffer Size  [ 8MB]         │                  │
     DVMT Mode                  [DVMT]         │                  │
     DVMT/FIXED Memory Size     [ 128MB]       │                  │
     Boot Display               [CRT+LFP]      │                  │
                                               └──────────────────┘

 ↑↓→← :Move   Enter:Select   +/-/PU/PD:Value   F10:Save   ESC:Exit   F1:General Help
   F5:  Previous Values         F6: Fail-Safe Defaults     F7: Optimized Defaults
```

Figure 5.6.   Advanced Chipset Features Setup

This section allows you to configure the system based on the specific features of the installed chipset. This chipset manages bus speeds and access to system memory resources, such as DRAM and the external cache.   It must be stated that these items should never need to be altered.   The default settings have been chosen because they provide the best operating conditions for your system.   The only time you might consider making any changes would be if you discovered that data was being lost while using your system.

Table 5.6.   Advance Chipset Feature Selections

Description	Choice
DRAM Timing Selectable The value in this field depends on performance parameters of the installed memory chips (DRAM). Do not change the value from the factory setting unlees you install new memory that has a different performance rating than the original DRAMs.	**DRAM Timing Selectable** Manual . . . . . [ ] By SPD . . . . . [▮] ↑↓:Move ENTER:Accept ESC:Abort

Description	Choice
CAS Latency Time When synchronous DRAM is installed, the number of clock cycles of CAS latency depends on the DRAM timing. Do not reset this field from the default value specified by the system designer. You can select CAS latency time in HCLK of 3/4/5/6 or Auto. The system board designer should set the values in this field, depends on the DRAM installed specifications of the installed DRAM or the installed CPU.	CAS Latency Time 5 ..... [ ] 4 ..... [ ] 3 ..... [ ] 6 ..... [ ] Auto ..... [▮] ↑↓:Move ENTER:Accept ESC:Abort
DRAM RAS# to CAS# delay This field lets you insert a timing delay between the CAS and RAS strobe signals, used when DRAM is written to, read from, or refreshed. Fast gives faster performance; and Slow gives more stable performance. This field applies only when synchronous DRAM is installed in the system.	DRAM RAS# to CAS# Delay 2 ..... [ ] 3 ..... [ ] 4 ..... [ ] 5 ..... [ ] 6 ..... [ ] Auto ..... [▮] ↑↓:Move ENTER:Accept ESC:Abort
DRAM RAS# Precharge The precharge time is the number of cycles it takes for the RAS to accumulate its charge before DRAM refresh. If insufficient time is allowed, refresh may be incomplete and the DRAM may fail to retain data.	DRAM RAS# Precharge 2 ..... [ ] 3 ..... [ ] 4 ..... [ ] 5 ..... [ ] 6 ..... [ ] Auto ..... [▮] ↑↓:Move ENTER:Accept ESC:Abort
Precharge delay (tRAS) This item controls the number of DRAM clocks to activate the precharge delay. The default setting for the DRAM Cycle time tRAS is Auto.	Precharge delay (tRAS) Auto ..... [▮] 4 ..... [ ] 5 ..... [ ] 6 ..... [ ] 7 ..... [ ] 8 ..... [ ] 9 ..... [ ] 10 ..... [ ] 11 ..... [ ] 12 ..... [ ] 13 ..... [ ] 14 ..... [ ] 15 ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort

Description	Choice
System Memory Frequency This item sets the main memory frequency.　When you use an external graphics card, you can adjust this to enable the best performance for your system.	**System Memory Frequency** Auto　　　..... [▌] 533MHz　　..... [　] 667MHz　　..... [　] ↑↓:Move ENTER:Accept ESC:Abort
SLP_S4# Assertion Width Allows you to set the SLP_S4# assertion width.　The default setting is 1 - 2 Sec.	**SLP_S4# Assertion Width** 4 to 5 Sec.　..... [　] 3 to 4 Sec.　..... [　] 2 to 3 Sec.　..... [　] 1 to 2 Sec.　..... [▌] ↑↓:Move ENTER:Accept ESC:Abort
System BIOS Cacheable Selecting Enabled allows caching of the system BIOS ROM at F0000h-FFFFFh, resulting in better system performance. However, if any program writes to this memory area, a system error may result.	**System BIOS Cacheable** Disabled　　..... [　] Enabled　　..... [▌] ↑↓:Move ENTER:Accept ESC:Abort
Video BIOS Cacheable Selecting Enabled allows caching of the video BIOS ROM at C0000h - C7FFFh, resulting in better video performance. However, if any program writes to this memory area, a system error may result.	**Video BIOS Cacheable** Disabled..... [▌] Enabled ..... [　] ↑↓:Move ENTER:Accept ESC:Abort
Memory Hole At 15M-16M In order to improve performance, certain space in memory can be reserved for ISA card.　This memory must be mapped into the memory space below 16MB.	**Memory Hole At 15M-16M** Disabled..... [▌] Enabled ..... [　] ↑↓:Move ENTER:Accept ESC:Abort

PCI Express Root Port Function

```
        Phoenix - AwardBIOS CMOS Setup Utility
                PCI Express Root Port Func

   PCI Express Port 1        [Auto]      │      Item Help
   PCI Express Port 2        [Auto]      │
   PCI Express Port 3        [Auto]      │
   PCI Express Port 4        [Auto]      │   Menu Level ▶
   PCI Express Port 5        [Auto]      │
   PCI Express Port 6        [Auto]      │
   PCI-E Compliancy Mode     [v1.0a]     │
```

↑↓→← :Move   Enter:Select   +/-/PU/PD:Value   F10:Save   ESC:Exit   F1:General Help
    F5: Previous Values   F6: Fail-Safe Defaults   F7: Optimized Defaults

Figure 5.7.   PCI Express Root Port Function

Table 5.7.   PCI Express Root Port Function Selections

Description	Choice
PCI Express Port 1/2/3/4/5/6 This item allows you to enable or disable or Auto configure the PCI Express Port 1/2/3/4/5/6.	PCI Express Port 1 Auto ..... [■] Enabled ..... [ ] Disabled ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort
PCI-E Compliancy Mode This item allows you to set PCI Express compliancy mode.	PCI-E Compliancy Mode v1.0a ..... [■] v1.0 ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort

VGA setting

The field under the On-Chip VGA Setting and their defaults settings are:

Table 5.8.   VGA Setting Selections

Description	Choice
On-Chip Frame Buffer Size When Enabled, a fixed VGA frame buffer from A000h to BFFFh and a CPU-to-PCI write buffer are implemented.	On-Chip Frame Buffer Size 1MB ..... [ ] 8MB ..... [▌] ↑↓:Move ENTER:Accept ESC:Abort
DVMT Mode Allows you to set the Dynamic Video Memory Technology (DVMT) mode.	DVMT Mode FIXED ..... [ ] DVMT ..... [▌] BOTH ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort
DVMT/FIXED Memory Size Allows you to set the Dynamic Video Memory Technology (DVMT) memory size.	DVMT/FIXED Memory Size 64MB ..... [ ] 128MB ..... [▌] 224MB ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort
Boot Display This item allows you to select the boot display device.	Boot Display CRT ..... [ ] CRT+ EFP ..... [▌] - ↑↓:Move ENTER:Accept ESC:Abort

Integrated Peripherals

This section sets configurations for your hard disk and other integrated peripherals.   The first screen shows three main items for user to select.   Once an item selected, a submenu appears.   Details follow.

```
        Phoenix - AwardBIOS CMOS Setup Utility
                 Integrated Peripherals

   ▶ OnChip IDE Device      [Press Enter]          Item Help
   ▶ Onboard Device         [Press Enter]
   ▶ SuperIO Device         [Press Enter]    Menu Level ▶




↑↓→← :Move    Enter:Select    +/-/PU/PD:Value    F10:Save    ESC:Exit    F1:General Help
   F5: Previous Values          F6: Fail-Safe Defaults        F7: Optimized Defaults
```

Figure 5.8.   Integrated Peripherals

OnChip IDE Device

Figure 5.9.   OnChip IDE Device

Table 5.9.   On Chip IDE Device Selections

Description	Choice
HDD Select You can choose your CF card type to Auto Select or UDMA 33.	

Description	Choice
IDE HDD Block mode Block mode is also called block transfer, multiple commands, or multiple sectors read/write.　If your IDE hard drive supports block mode (most new drives do), select Enabled for automatic detection of the optimal number of block read/writes per sector the drive can support.	IDE HDD Block Mode Disabled　..... [ ] Enabled　..... [▌] ↑↓:Move ENTER:Accept ESC:Abort
IDE DMA transfer access This item allows you to enable or disable the IDE DMA transfer access.	IDE DMA transfer access Disabled　..... [ ] Enabled　..... [▌] ↑↓:Move ENTER:Accept ESC:Abort
On-Chip Primary PCI IDE The integrated peripheral controller contains an IDE interface with support for 2 IDE channels.　Select Enabled to activate each channel separately.	On-Chip Primary PCI IDE Disabled..... [ ] Enabled ..... [▌] ↑↓:Move ENTER:Accept ESC:Abort

Description	Choice
IDE Primary Master / Slave PIO The two IDE PIO (Programmed Input/Output) fields let you set a PIO mode (0-4) for the one IDE device that the onboard IDE interface supports. In Auto mode, the system automatically determines the best mode for the device.	IDE Primary Master PIO Auto ..... [▌] Mode 0 ..... [ ] Mode 1 ..... [ ] Mode 2 ..... [ ] Mode 3 ..... [ ] Mode 4 ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort IDE Primary Slave PIO Auto ..... [▌] Mode 0 ..... [ ] Mode 1 ..... [ ] Mode 2 ..... [ ] Mode 3 ..... [ ] Mode 4 ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort
IDE Primary Master/Slave UDMA UDMA (Ultra DMA) is a DMA data transfer protocol that utilizes ATA commands and the ATA bus to allow DMA commands to transfer data at a maximum burst rate of 33 MB/s. When you select Auto in the two IDE UDMA fields, the system automatically determines the optimal data transfer rate for each IDE device.	IDE Primary Master UDMA Disabled ..... [ ] Auto ..... [▌] ↑↓:Move ENTER:Accept ESC:Abort IDE Primary Slave UDMA Disabled ..... [ ] Auto ..... [▌] ↑↓:Move ENTER:Accept ESC:Abort

On Chip Serial ATA setting

Table 5.10.   On Chip Serial ATA Setting Selection

Description	Choice
SATA Mode You can set SATA hard disk mode in IDE, AHCI or RAID mode. In this product, it cannot be changed except IDE.	SATA Mode IDE ..... [▮] RAID ..... [ ] AHCI ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort
On-Chip Serial ATA Disabled : Disable SATA controller. Combined Mode : Enable the combination of SATA and PATA. Up to three IDE devices are available, one for SATA and two for PATA. Enhanced Mode : Enable both SATA and PATA. Up to three IDE drives are provided for this mode. SATA Only : Set SATA to operate in legacy mode.	On-Chip Serial ATA Disabled ..... [ ] Combined Mode ..... [▮] Enhanced Mode ..... [ ] SATA Only ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort
SATA PORT Speed Settings Disable speed settings of, or forcibly set "GEN I" or "GEN II" to the SATA port. In this product, it cannot be changed except Disabled.	SATA PORT Speed Settings Disabled ..... [▮] Force GEN I ..... [ ] Force GEN II ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort
PATA IDE Mode PATA IDE mode is fixed to "Secondary".	PATA IDE Mode Secondary ..... [▮] ↑↓:Move ENTER:Accept ESC:Abort

Description	Choice
SATA Port Set serial ATA channel to "Primary". Notes : Only this item is displayed.	SATA Port P0, P2 is Primary ↑↓:Move ENTER:Accept ESC:Abort

Onboard Device

Figure 5.10. Onboard Device

Table 5.11. On board device Selections

Description	Choice
USB Over Current Support Enable or disable the USB Over Current. In normal cases, set it as "Enabled".	

Description	Choice
USB 2.0 Controller Enable or disable the Onboard USB 2.0 function. In normal cases, set it as "Enabled".	USB 2.0 Controller Enabled ..... [▮] Disabled ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort
USB Operation Mode Select one of USB operation mode.	USB Operation Mode High Speed ..... [▮] Full/Low Speed ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort
USB Keyboard Support Select "Enabled" when using the USB keyboard.	USB Keyboard Support Disabled ..... [▪] Enabled ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort
USB Storage Function Select "Enabled" when using the USB storage.	USB Keyboard Support Disabled ..... [ ] Enabled ..... [▪] ↑↓:Move ENTER:Accept ESC:Abort

Description	Choice
Azalia/AC97 Audio Select Select audio function and/or enable or disable device(s).　In normal cases, set it as "Auto".	Azalia/AC97 Audio Select Auto　　　　　　　..... [▌] Azalia　　　　　　..... [　] AC97 Audio and Modem　..... [　] AC97 Audio only　..... [　] AC97 Modem only　..... [　] All Disable　　　..... [　] ↑↓:Move ENTER:Accept ESC:Abort
Onboard LAN1 Select "Enabled" when using the Onboard LAN1 controller.	Onboard LAN 1 Enabled　　　..... [▌] Disabled　　　..... [　] ↑↓:Move ENTER:Accept ESC:Abort
Onboard LAN2 Select "Enabled" when using the Onboard LAN2 controller.	Onboard LAN 2 Enabled　　　..... [▌] Disabled　　　..... [　] ↑↓:Move ENTER:Accept ESC:Abort

Super IO Device

```
            Phoenix - AwardBIOS CMOS Setup Utility
                        SuperIO Device
┌─────────────────────────────────────────┬──────────────────────┐
│  Onboard Serial Port 1      [3F8/IRQ4]   │     Item Help        │
│  Onboard Serial Port 2      [2F8/IRQ3]   │                      │
│  T.P. Serial Port           [Disabled]   │                      │
│                                          │  Menu Level ▶        │
│                                          │                      │
│                                          │                      │
│                                          │                      │
│                         .                │                      │
│                                          │                      │
│                                          │                      │
│                                          │                      │
│                                          │                      │
│                                          │                      │
│                                          │                      │
│                                          │                      │
│                                          │                      │
└─────────────────────────────────────────┴──────────────────────┘
```

↑↓→← :Move   Enter:Select   +/-/PU/PD:Value   F10:Save   ESC:Exit   F1:General Help
   F5: Previous Values   F6: Fail-Safe Defaults   F7: Optimized Defaults

Figure 5.11. Super IO Device

Table 5.12. Super I/O device Selections

Description	Choice
Onboard Serial Port 1 Select an address and corresponding interrupt for the first serial port.	Onboard Serial Port 1 Disabled . . . . . [ ] 3F8/IRQ4. . . . . [▌] ↑↓:Move ENTER:Accept ESC:Abort
Onboard Serial Port 2 Select an address and corresponding interrupt for the second serial port.	Onboard Serial Port 2 Disabled . . . . . [ ] 2F8/IRQ3. . . . . [▌] ↑↓:Move ENTER:Accept ESC:Abort

Description	Choice
T.P. Serial Port Enable or disable touch panel serial port. In normal cases, set it as "Disable".	T.P. Serial Port EFP………….…..[ ] LFP……….…..…..[ ] OPTION…….…..[ ] Disable…….…..[■] ↑↓:Move ENTER:Accept ESC:Abort

Power Management Setup

The Power Management Setup allows you to configure you system to most effectively save energy while operating in a manner consistent with your own style of computer use.

Figure 5.12. Power Management Setup

Table 5.13. Power Management setup Selections

Description	Choice
ACPI Function When set to 'Enabled', turns on the ACPI Function. By default, this field is "Enabled".	

Description	Choice
Note: ACPI (Advanced Configuration and Power Interface) is a power management specification that makes hardware status information available to the operating system ACPI enables a computer to turn its peripherals on and off for improved power management. It also allows the computer to be turned on and off by external devices, so that mouse or keyboard activity wakes up the computer.	

ACPI Suspend Type

Only "S1(POS)" is supported for the ACPI suspense mode.

```
┌────────────────────────────────┐
│ ACPI Suspend Type              │
│                                │
│ S1(POS)        ..... [ ▌ ]      │
│                                │
│                                │
│                                │
│                                │
│ ↑↓:Move ENTER:Accept ESC:Abort │
└────────────────────────────────┘
```

Power management

This setting controls each timer function for the doze mode, stand-by mode, and suspense mode.   Using this category, you can select the type (degree) of power saving function.

User Define : Each mode can be set separately.   If enabled, the time duration for this setting ranges from 1 minute to 1 hour.   (Exception : the time duration for HDD power down ranges from 1 to 15 minutes.)

Min Saving : Performs minimum power management. (stand-by mode=1 hour, suspense mode=1 hour, HDD power down=15 minutes)

Max Saving : Performs maximum power management. (stand-by mode=1 minutes, suspense mode=1 minutes, HDD power down=1 minutes,)

```
┌────────────────────────────────┐
│ Power Management               │
│ User Define    ..... [ ▌ ]      │
│ Min Saving     ..... [   ]      │
│ Max Saving     ..... [   ]      │
│                                │
│                                │
│ ↑↓:Move ENTER:Accept ESC:Abort │
└────────────────────────────────┘
```

Video Off Method

This item decides how the display is blanked.

Blank Screen : This option writes blanks to the video buffer.
V/H SYNC+Blank : This option disconnects the power for the vertical and horizontal synchronizing ports of the system, and writes blanks to the video buffer.
DPMS : Signals for the initial power management of the display.

```
┌────────────────────────────────┐
│ Video Off Method               │
│ Blank Screen     ..... [   ]    │
│ V/H SYNC+Blank   ..... [   ]    │
│ DPMS             ..... [ ▌ ]    │
│                                │
│                                │
│ ↑↓:Move ENTER:Accept ESC:Abort │
└────────────────────────────────┘
```

Video Off In Suspend

This option sets how to turn off the monitor display.

```
┌────────────────────────────────┐
│ Video Off In Suspend           │
│ No               ..... [   ]    │
│ Yes              ..... [ ▌ ]    │
│                                │
│                                │
│ ↑↓:Move ENTER:Accept ESC:Abort │
└────────────────────────────────┘
```

Description	Choice
Suspend Type Enables the selection of "Suspend type". Available options are "Stop Grant" and "PwrOn Suspend".	**Suspend Type** Stop Grant . . . . . [█] PwrOn Suspend . . . . . [ ] ↑↓:Move ENTER:Accept ESC:Abort
MODEM Use IRQ If you want to resume the system from power saving mode on the incoming call to modem, specifies here the interruption request line (IRQ) used by the modem. To use this function, you need to connect the Fax / Modem to Wake On Modem connector of keyboard computer.	**MODEM Use IRQ** NA . . . . . [ ] 3 . . . . . [█] 4 . . . . . [ ] 5 . . . . . [ ] 7 . . . . . [ ] 9 . . . . . [ ] 10 . . . . . [ ] 11 . . . . . [ ] ↑↓:Move ENTER:Accept ESC:Abort
Suspend Mode If no power management event happens within the specified time duration, the CPU clock stops and the video signal is suspended. When a power management event is detected, the full powered functions are recovered. * If the item of USB Keyboard Support is set [Enabled], this function is not available.	**Suspend Mode** Disabled . . . . . [█] 1 Min . . . . . [ ] 2 Min . . . . . [ ] 4 Min . . . . . [ ] 8 Min . . . . . [ ] 12 Min . . . . . [ ] 20 Min . . . . . [ ] 30 Min . . . . . [ ] 40 Min . . . . . [ ] 1 Hour . . . . . [ ] ↑↓:Move ENTER:Accept ESC:Abort

Description	Choice
HDD Power Down If set in "Enabled", the hard disk drive goes into the power saving mode when no system operation is done after the specified time duration.　Other devices continues to be active.	HDD Power Down Disabled .....[▊] 1 Min .....[　] 2 Min .....[▊] 3 Min .....[　] 4 Min .....[　] 5 Min .....[　] 6 Min .....[　] 7 Min .....[　] 8 Min .....[　] 9 Min .....[　] 10 Min .....[　] 11 Min .....[　] 12 Min .....[　] 13 Min .....[　] 14 Min .....[　] 15 Min .....[　] ↑↓:Move ENTER:Accept ESC:Abort
Soft-Off by PWR-BTTN In case of Soft-Off (S5) by the power button, specifies the delay time to wait till the power button takes effect.　In "Instant-Off", the power button takes effect immediately after pushed down.　In "Delay 4 sec", the power button need to be pushed and held for 4 seconds to take effect. Note that the power button is controlled by the OS in case of Windows.	Soft-Off by PWR-BTTN Instant-Off .....[▊] Delay 4 Sec .....[　] ↑↓ :Move ENTER:Accept ESC:Abort
PWRON after PWR-Fail Only "On" is supported for the PWRON After PWR-Fail. This feature is activated whenever a power is returned after any types of power failures such as outage.	PWRON After PWR-Fail Former-Sts .....[　] On .....[▊] Off .....[　] ↑↓:Move ENTER:Accept ESC:Abort
Wake-Up by PCI card Selecting "Enable" enables On board LAN "WOL" function. Note that the "PCI Express Wake" setting below should be Enable alike.	Wake-Up by PCI card Disabled .....[▊] Enabled .....[　] ↑↓ :Move ENTER:Accept ESC:Abort

Description	Choice
Power On by Ring When set to "Enabled", you can boot the system by incoming call (Ring signal) to the modem connected COM1 or COM2.	**Power On by Ring** Disabled ..... [▌] Enabled ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort
Resume by Alarm When Enabled, your can set the date and time at which the RTC (real-time clock) alarm awakens the system.	**Resume by Alarm** Disabled ..... [▌] Enabled ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort
Date(of Month) Alarm Min= 0 Max= 31 Key in a DEC number : ↑↓:Move ENTER:Accept ESC:Abort	Time(hh:mm:ss) Alarm Min= 0 Max= 23 Key in a DEC number : ↑↓:Move ENTER:Accept ESC:Abort
Reload Global Timer Events：When Enabled, an event occurring on each listed device restarts the global timer for Standby mode.	
Primary IDE 0 Disabled ..... [▌] Enabled ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort	**Primary IDE 1** Disabled ..... [▌] Enabled ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort
FDD, COM Port Disabled ..... [▌] Enabled ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort	**PCI PIRQ[A-D]#** Disabled ..... [▌] Enabled ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort

PnP/PCI Configuration Setup

This section describes configuring the PCI bus system. PCI, or Personal Computer Interconnect, is a system which allows I/O devices to operate at speeds nearing the speed the CPU itself uses when communicating with its own special components.   This section covers some very technical items and it is strongly recommended that only experienced users should make any changes to the default settings.

```
            Phoenix - AwardBIOS CMOS Setup Utility
                    PnP/PCI Configurations

    Init Display First          [PCI Slot]          Item Help
    Reset Configuration Data    [Disabled]

    Resources Controlled By     [Auto(ESCD)]     Menu Level ▶
  x  IRQ Resources               Press Enter

    PCI/VGA Palette Snoop       [Disabled]
    INT Pin 1 Assignment        [Auto]
    INT Pin 2 Assignment        [Auto]
    INT Pin 3 Assignment        [Auto]
    INT Pin 4 Assignment        [Auto]
    INT Pin 5 Assignment        [Auto]
    INT Pin 6 Assignment        [Auto]
    INT Pin 7 Assignment        [Auto]
    INT Pin 8 Assignment        [Auto]

    **   PCI Express relative items   **
    Maximum Payload Size        [128]


↑↓→← :Move    Enter:Select    +/-/PU/PD:Value    F10:Save    ESC:Exit    F1:General Help
    F5: Previous Values        F6: Fail-Safe Defaults           F7: Optimized Defaults
```

Figure 5.13. PnP/PCI Configuration Setup

Table 5.14. PCI PnP/PCI Configuration Setup Selections

Description	Choices
Init Display First Initialize the onboard video display before initializing any other display device on the system. Thus the onboard display becomes the primary display.	Init Display First PCI Slot ..... [■] Onboard ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort

Description	Choices
Reset Configuration Data Normally, you leave this field Disabled. Select Enabled to reset Extended System Configuration Data (ESCD) when you exit Setup if you have installed a new add-on and the system reconfiguration has caused such a serious conflict that the operating system can not boot	**Reset Configuration Data** Disabled ..... [▌] Enabled ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort
Resource Controlled by The Award Plug and Play BIOS can automatically configure all the boot and Plug and Play – compatible devices. If you select Auto, all the interrupt request (IRQ) and DMA assignment fields disappear, as the BIOS automatically assigns them	**Resources Controlled By** Auto(ESCD) ..... [▌] Manual ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort

IRQ n Resources

```
            Phoenix - AwardBIOS CMOS Setup Utility
                       IRQ Resources

    IRQ-3  assigned to      [PCI Device]  │      Item Help
    IRQ-4  assigned to      [PCI Device]  │
    IRQ-5  assigned to      [PCI Device]  │
    IRQ-7  assigned to      [PCI Device]  │ Menu Level ▶
    IRQ-9  assigned to      [PCI Device]  │
    IRQ-10 assigned to      [PCI Device]  │ Legacy ISA for devices
    IRQ-11 assigned to      [PCI Device]  │ compliant with the
    IRQ-12 assigned to      [PCI Device]  │ original PC AT bus
    IRQ-14 assigned to      [PCI Device]  │ specifications, PCI/ISA
    IRQ-15 assigned to      [PCI Device]  │ Pnp for devices
                                          │ compliant with the
                                          │ Plug and Play standard
                                          │ whether designed for
                                          │ PCI or ISA bus
                                          │ architecture

 ↑↓→← :Move   Enter:Select   +/-/PU/PD:Value   F10:Save   ESC:Exit   F1:General Help
   F5: Previous Values      F6: Fail-Safe Defaults      F7: Optimized Defaults
```

Figure 5.14.   IRQ n Resources

When resources are controlled manually, assign each system interrupt as on of the following type, depending on the type of device using the interrupt.

Legacy ISA Devices compliant with the original PC AT bus specification, requiring a specific interrupt (Such as IRQ4 for serial port 1)

PCI/ISA PnP Devices compliant with the Plug and Play standard, whether designed for PCI or ISA bus architecture.

The Choice : Legacy ISA and PCI/ISA PnP

Description	Choices
PCI/VGA Palette Snoop This item is designed to overcome some problems that can be caused by some non-standard VGA cards. This board includes a built-in VGA system that does not require palette snooping so you must leave this item disabled. Leave this field at Disabled.	PCI/VGA Palette Snoop Disabled ..... [▮] Enabled ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort

Description	Choices
INT Pin 1 Assignment Devices(s) using this INT ： Display Controller - Bus 0 Dev 2 Func 0 USB 1.0/1.1 UHCI Controller - Bus 0 Dev 29 Func 3	INT Pin 1 Assignment Auto ..... [█] 3 ..... [ ] 4 ..... [ ] 5 ..... [ ] 7 ..... [ ] 9 ..... [ ] 10 ..... [ ] 11 ..... [ ] 12 ..... [ ] 14 ..... [ ] 15 ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort
INT Pin 2 Assignment Devices(s) using this INT ： Multimedia Device - Bus 0 Dev 30 Func 2	INT Pin 2 Assignment Auto ..... [█] 3 ..... [ ] 4 ..... [ ] 5 ..... [ ] 7 ..... [ ] 9 ..... [ ] 10 ..... [ ] 11 ..... [ ] 12 ..... [ ] 14 ..... [ ] 15 ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort
INT Pin 3 Assignment Devices(s) using this INT ： USB 1.0/1.1 UHCI Controller - Bus 0 Dev 29 Func 2	INT Pin 3 Assignment Auto ..... [█] 3 ..... [ ] 4 ..... [ ] 5 ..... [ ] 7 ..... [ ] 9 ..... [ ] 10 ..... [ ] 11 ..... [ ] 12 ..... [ ] 14 ..... [ ] 15 ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort

Description	Choices
INT Pin 4 Assignment Devices(s) using this INT： IDE Controller - Bus 0 Dev 31 Func 2 USB 1.0/1.1 UHCI Controller - Bus 0 Dev 29 Func 1 SMBus Controller - Bus 0 Dev 31 Func 3	INT Pin 4 Assignment Auto ..... [▌] 3 ..... [ ] 4 ..... [ ] 5 ..... [ ] 7 ..... [ ] 9 ..... [ ] 10 ..... [ ] 11 ..... [ ] 12 ..... [ ] 14 ..... [ ] 15 ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort
INT Pin 5 Assignment Devices(s) using this INT： Network Controller - Bus 1 Dev 8 Func 0 Simple Communication Controller - Bus 0 Dev 30 Func 3	INT Pin 5 Assignment Auto ..... [▌] 3 ..... [ ] 4 ..... [ ] 5 ..... [ ] 7 ..... [ ] 9 ..... [ ] 10 ..... [ ] 11 ..... [ ] 12 ..... [ ] 14 ..... [ ] 15 ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort
INT Pin 6 Assignment Devices(s) using this INT： - Reserved	INT Pin 6 Assignment Auto ..... [▌] 3 ..... [ ] 4 ..... [ ] 5 ..... [ ] 7 ..... [ ] 9 ..... [ ] 10 ..... [ ] 11 ..... [ ] 12 ..... [ ] 14 ..... [ ] 15 ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort

Description	Choices
INT Pin 7 Assignment Devices(s) using this INT ： - Reserved	INT Pin 7 Assignment Auto ..... [❚] 3 ..... [ ] 4 ..... [ ] 5 ..... [ ] 7 ..... [ ] 9 ..... [ ] 10 ..... [ ] 11 ..... [ ] 12 ..... [ ] 14 ..... [ ] 15 ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort
INT Pin 8 Assignment Devices(s) using this INT ： USB 1.0/1.1 UHCI Controller - Bus 0 Dev 29 Func 0 USB 2.0 EHCI Controller - Bus 0 Dev 29 Func 7	INT Pin 8 Assignment Auto ..... [❚] 3 ..... [ ] 4 ..... [ ] 5 ..... [ ] 7 ..... [ ] 9 ..... [ ] 10 ..... [ ] 11 ..... [ ] 12 ..... [ ] 14 ..... [ ] 15 ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort

PCI Express relative items

Table 5.15.　PCI Express Relative Items Selections

Description	Choices
Maximum Payload Size Set maximum TLP payload size for the PCI Express Devices. The unit is byte.	Maximum Payload Size 128 ..... [❚] 256 ..... [ ] 512 ..... [ ] 1024 ..... [ ] 2048 ..... [ ] 4096 ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort

PC Health Status

```
         Phoenix - AwardBIOS CMOS Setup Utility
                   PC Health Status

  CPU Temprature Function      [Disabled]          Item Help
  Warning Beep                 [Disabled]
  CPU THRM-Thrttling           [Disabled]
  Current  CPU  Temp.            46°C            Menu Level ▶
  Current  System  Temp.         53°C
  Vcore                          0.98V
  +12V                          11.98V
  +3.3V                          3.29V
  +1.5V                          1.50V
  VBAT                           3.20V
  5VSB  (V)                      5.07V




↑↓→← :Move    Enter:Select    +/-/PU/PD:Value   F10:Save    ESC:Exit    F1:General Help
   F5:  Previous Values        F6: Fail-Safe  Defaults      F7: Optimized  Defaults
```

Figure 5.15.   PC Health Status

The BIOS shows the PC health status in this window.

Table 5.16. PC Health Status Selections

Description	Choices
CPU Temperature Function When using "Warning Beep" and "CPU THRM-Throttling" below, specifies the threshold temperature to the CPU temperature.	CPU Temprature Function Disabled ..... [▌] 75℃/167℉ ..... [ ] 80℃/176℉ ..... [ ] 85℃/185℉ ..... [ ] 90℃/194℉ ..... [ ] 95℃/205℉ ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort
Warning Beep Disabled : Disables this function. Enabled : Beep will sound as a warning when the temperature exceeds the value set in "CPU Temperature Function" above.	Warning Beep Disabled ..... [▌] Enabled ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort
CPU THRM-Throttling When the temperature exceeds the value set in "CPU Temperature Function" above, the slot ring is activated in selected percentages to restrain the heat generation from CPU. Note that the operation in Windows is not supported.	CPU THRM-Throttling Disabled ..... [▌] 75.0% ..... [ ] 50.0% ..... [ ] 25.0% ..... [ ] ↑↓:Move ENTER:Accept ESC:Abort
Current CPU Temp.	This field displays the current CPU temperature.
Current System Temp.	This field displays the current system temperature.
Vcore / +12V / +3.3V / +1.5V / VBAT / 5VSB	This field displays the current voltage.

Frequency/Voltage Control

Figure 5.16. Frequency/Voltage Control

Table 5.17.   Frequency/Voltage Control Selections

Description	Choices
Spread Spectrum When the system clock generator pulses, the extreme values of the pulse generate excess EMI. Enabling pulse spectrum spread modulation changes the extreme values from spikes to flat curves, thus reducing EMI. This benefit may in some cases be outweighed by problems with timing-critical devices, such as a clock-sensitive SCSI device.	

Defaults Menu

Selecting "Defaults" from the main menu shows you two options which are described below

Load Fail-Safe Defaults

When you press <Enter> on this item you get a confirmation dialog box with a message similar to:

    Load Fail-Safe Defaults (Y/N) ? N

Pressing 'Y' loads the BIOS default values for the most stable, minimal-performance system operations.

Load Optimized Defaults

When you press <Enter> on this item you get a confirmation dialog box with a message similar to:

    Load setup Defaults (Y/N) ? N

Pressing 'Y' loads the default values that are factory settings for optimal performance system operations.

Supervisor /User Password Setting

You can set either supervisor or user password, or both of then.   The differences between are:

SUPERVISOR PASSWORD: can enter and change the options of the setup menus.

USER PASSWORD: just can only enter but do not have the right to change the options of the setup menus.   When you select this unction, the following message will appear at the center of the screen to assist you in creating a password.

ENTER PASSWORD:

Type the password, up to eight characters in length, and press <Enter>.   The password typed now will clear any previously entered password from CMOS memory.   You will be asked to confirm the password. Type the password again and press <Enter>.   You may also press <Esc> to abort the selection and not enter a password.

To disable a password, just press <Enter> when you are prompted to enter the password.   A message will confirm the password will be disabled.   Once the password is disabled, the system will boot and you can enter Setup freely.

PASSWORD DISABLED:

When a password has been enabled, you will be prompted to enter it every time you try to enter Setup. This prevents an unauthorized person from changing any part of your system configuration.

Additionally, when a password is enabled, you can also require the BIOS to request a password every time your system is rebooted.   This would prevent unauthorized use of your computer.

You determine when the password is required within the BIOS Features Setup Menu and its Security option.   If the Security option is set to "System", the password will be required both at boot and at entry to Setup.   If set to "Setup", prompting only occurs when trying to enter Setup.

Exit Selecting

Save & Exit Setup

Pressing <Enter> on this item asks for confirmation :

    Save to CMOS and EXIT (Y/N)? Y

Pressing "Y" stores the selections made in the menus in CMOS – a special section of memory that stays on after you turn your system off.   The next time you boot your computer, the BIOS configures your system according to the Setup selections stored in CMOS.   After saving the values the system is restarted again.

Exit Without Saving

Pressing <Enter> on this item asks for confirmation:

    Quit without saving (Y/N)? Y

This allows you to exit Setup without storing in CMOS any change.   The previous selections remain in effect.   This exits the Setup utility and restarts your computer.

POST Messages

During the Power On Self-Test (POST), if the BIOS detects an error requiring you to do something to fix, it will either sound a beep code or display a message.

If a message is displayed, it will be accompanied by:

PRESS F1 TO CONTINUE, CTRL-ALT-ESC OR DEL TO ENTER SETUP

POST Beep

Currently there are two kinds of beep codes in BIOS.   This code indicates that a video error has occurred and the BIOS cannot initialize the video screen to display any additional information.   This beep code consists of a single long beep followed by two short beeps.   The other code indicates that your DRAM error has occurred.   This beep code consists of a single long beep repeatedly.

Error Messages

One or more of the following messages may be displayed if the BIOS detects an error during the POST. This list includes messages for both the ISA and the EISA BIOS.

CMOS battery has failed

CMOS battery is no longer functional. It should be replaced.

DISK BOOT failure

[INSERT SYSTEM DISK AND PRESS ENTER]

No boot device was found.   This could mean that either a boot drive was not detected or the drive does not contain proper system boot files.   Insert a system disk into Drive A: and press <Enter>.   If you assumed the system would boot from the hard drive, make sure the controller is inserted correctly and all cables are properly attached. Also be sure the disk is formatted as a boot device.   Then reboot the system.

Display switch is set incorrectly

Display switch on the motherboard can be set to either monochrome or color.   This indicates the switch is set to a different setting than indicated in Setup.   Determine which setting is correct, and then either turn off the system and change the jumper, or enter Setup and change the VIDEO selection.

Display type has changed since last BOOT

Since last powering off the system, the display adapter has been changed.   You must configure the system for the new display type.

EISA configuration checksum error

[PLEASE RUN EISA CONFIGURATION UTILITY]

The EISA non-volatile RAM checksum is incorrect or cannot correctly read the EISA slot.   This can indicate either the EISA non-volatile memory has become corrupt or the slot has been configured incorrectly.   Also be sure the card is in-stalled firmly in the slot.

EISA configuration is incomplete

[PLEASE RUN EISA CONFIGURATION UTILITY]

The slot configuration information stored in the EISA non-volatile memory is incomplete.

⚠ CAUTION
    When either of these errors appears, the system will boot in ISA mode, which allows you to run the EISA Configuration Utility.

Error encountered initializing hard drive

Hard drive cannot be initialized.   Be sure the adapter is installed correctly and all cables are correctly and firmly attached.   Also be sure the correct hard drive type is selected in Setup.

Error initializing hard disk controller

Cannot initialize controller.   Make sure the cord is correctly and firmly installed in the bus.   Be sure the correct hard drive type is selected in Setup.   Also check to see if any jumper needs to be set correctly on the hard drive.

EISA configuration invalid

[PLEASE RUN EISA CONFIGURATION UTILITY]

The non-volatile memory containing EISA configuration information was programmed incorrectly or has become corrupt.   Re-run EISA configuration utility to correctly program the memory.

⚠ CAUTION
    When either of these errors appears, the system will boot in ISA mode, which allows you to run the EISA Configuration Utility.

Keyboard error or no keyboard present

Cannot initialize the keyboard.   Make sure the keyboard is attached correctly and no keys are being pressed during the boot.

If you are purposely configuring the system without a keyboard, set the error halt condition in Setup to HALT ON ALL, BUT KEYBOARD.   This will cause the BIOS to ignore the missing keyboard and continue the boot.

Memory address error at…

Indicates a memory address error at a specific location.   You can use this location along with the memory map for your system to find and replace the bad memory chips.

Memory parity error at…

Indicates a memory parity error at a specific location.   You can use this location along with the memory map for your system to find and replace the bad memory chips.

Memory size has changed since last BOOT

Memory has been added or removed since the last boot.   In EISA mode use Configuration Utility to reconfigure the memory configuration.   In ISA mode enter Setup and enter the new memory size in the memory fields.

Memory verify error at…

Indicates an error verifying a value already written to memory.   Use the location along with your system's memory map to locate the bad chip.

Offending address not found

This message is used in conjunction with the I/O CHANNEL CHECK and RAM PARITY ERROR messages when the segment that has caused the problem cannot be isolated.

Offending segment

This message is used in conjunction with the I/O CHANNEL CHECK and RAM PARITY ERROR messages when the segment that has caused the problem has been isolated.

Press a key to REBOOT

This will be displayed at the bottom screen when an error occurs that requires you to reboot.   Press any key and the system will reboot.

Press F1 to disable NMI, F1 to REBOOT

When BIOS detects a Non-maskable Interrupt condition during boot, this will allow you to disable the NMI and continue to boot, or you can reboot the system with the NMI enabled.

RAM parity error

[CHECKING FOR SEGMENT…]

Indicates a parity error in Random Access Memory.

Detected unexpected EISA board

[PLEASE RUN EISA CONFIGURATION UTILITY]

A valid board ID was found in a slot that was configured as having no board ID.

⚠ CAUTION
> When this error appears, the system will boot in ISA mode, which allows you to run the EISA Configuration Utility.

Detected unexpected EISA board

[PLEASE RUN EISA CONFIGURATION UTILITY]

The board installed is not responding to the ID request, or no board ID has been found in the indicated slot.

⚠ CAUTION
> When this error appears, the system will boot in ISA mode, which allows you to run the EISA Configuration Utility.

Slot not empty

Indicates that a slot designated as empty by the EISA Configuration Utility actually con-tains a board.

⚠ CAUTION
> When this error appears, the system will boot in ISA mode, which allows you to run the EISA Configuration Utility.

System halted, (CTRL-ALT-DEL) to REBOOT…

Indicates the present boot attempt has been aborted and the system must be rebooted.   Press and hold down the CTRL and ALT keys and press DEL.

Board in slot is incorrect

[PLEASE RUN EISA CONFIGURATION UTILITY]

The board ID does not match the ID stored in the EISA non-volatile memory.

⚠ CAUTION
When this error appears, the system will boot in ISA mode, which allows you to run the EISA Configuration Utility.

Hard disk(s) fail (80)

HDD reset failed.

Hard disk(s) fail (40)

HDD controller diagnostics failed.

Hard disk(s) fail (20)

HDD initialization error.

Hard disk(s) fail (10)

Unable to recalibrate fixed disk.

Hard disk(s) fail (08)

Sector Verify failed.

Keyboard is locked out – Unlock the key

Unlock the key. BIOS detect the keyboard is locked. P17 of keyboard controller is pulled low.

Keyboard error or no keyboard present

Cannot initialize the keyboard.   Make sure the keyboard is attached correctly and no keys are being pressed during the boot.

Manufacturing POST loop

System will repeat POST procedure infinitely while the P15 of keyboard controller is pulled low.   This is also used for M/B burn in test.

BIOS ROM checksum error – System halted

The checksum of ROM address F0000H-FFFFFH is bad.

Memory test fail

BIOS reports the memory tests fail if the onboard memory is tested error.

Locations and Settings of CMOS/ROM Clear SW

If an unexpected activation failure occurs due to the BIOS setting, the CMOS/ROM clear SW can be set in order to disable the BIOS setting and start up the system.
In the normal operation, leave the CMOS/ROM clear SW to the factory setting (1-4, 2-3 : OFF).

⚠ CAUTION ─────────────────────────────────────

Touching the product immediately after it is switched off may cause burning.
When setting the SW, let it cool completely beforehand.

(1) Remove the cover on the back from the cabinet.
(Number of screws, cover : 3)
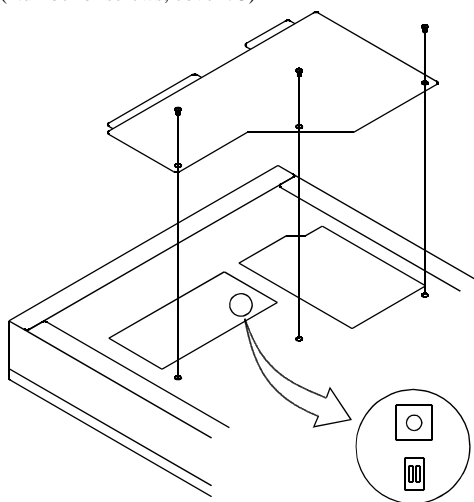
Figure 5.17.   Removal of Cover and Heat Sink and Locations of CMOS/ROM Clear SW

When the cover on the back is removed, the CMOS clear push button (S2) and ROM clear dip switch (S1) will appear, as shown in the above figure.

(2) Push the CMOS clear push button (S2), hold down for around ten seconds, and then release the push button.
(3) Turn 1-4 of ROM clear dip switch (S1) on.
(4) Install the cover to the place where it was.   Do not tighten screws with excess force.
(5) Start the BIOS setup screen for resetting and then turn off the power.
(6) Remove the cover and then turn the ROM clear dip switch (S1) off.
(7) Mount the cover in the reverse procedure of removing them.

⚠ CAUTION

- Screw holes may be damaged if screws are tightened with a torque greater than the specified torque.
  The specified tightening torque is 1 - 1.5kgf·cm.
- When removing the screws which secure the cover on the back, follow instructions below.
  In case of mishandling, the threaded hole could be stripped.
- When removing the cover, use screwdriver tips shown below respectively :
  Cover : (+)No.0
- Do not use the electric screwdriver when removing screws of the cover.

6. Appendix

Memory Map

Memory Segments	Comments
00000h - 9FFFh	0 - 640K DOS Region
A0000h - BFFFFh	Video Buffer
B0000h - B7FFFh	Monochrome Adapter range
C0000h - CFFFFh	Video BIOS
D0000h - DFFFFh	Expansion Area
E0000h - EFFFFh	Extended System BIOS Area
F0000h - FFFFFh	System BIOS Area
100000h - FFFFFFFFh	Extended Memory Area
00100000 - Top of Main Memory	Main DRAM Address Range
Top of Main Memory	Extended SMRAM Address Range
Top of Main Memory To 4GB	PCI Memory Address Range
FEC0000h - FECFFFFFh, FEE00000h - FEEFFFFFh	APIC configuration space
FFE0000h - FFFFFFFFh	High BIOS Area

Figure 6.1.   Memory Map

I/O Port Addresses

Table 6.1.   I/O Port Addresses

Address	Size	Description
0000 - 000F	16 bytes	DMA controller
0010 - 001F	16 bytes	Reserved
0020 - 0021	2 bytes	PIC interrupt controller
0022 - 003F	30 bytes	Reserved
0040 - 0043	4 bytes	System timer 1
0044 - 005F	24 bytes	Reserved
0060	1 byte	Keyboard controller
0061	1 byte	NMI, speaker controller
0062 - 0063	2 bytes	Reserved
0064	1 byte	Keyboard controller
0065-006F	11bytes	Reserved
0070 - 0073	4 bytes	RTC real time clock
0074 - 007F	12bytes	Reserved
0080 - 0090	17 bytes	DMA page register
00A0 - 00A1	2 bytes	Interrupt controller 2
00A2 - 00BF	28 bytes	Reserved
00C0 - 00DE	31 bytes	DMA controller 2
00E0 - 00EF	16 bytes	Reserved
00F0 - 00FF	16 bytes	Arithmetic processor for numerical values
01F0 - 01F7	8 bytes	Primary IDE controller
0274 - 0277	4 bytes	Reserved (ISA PnP)
0279 - 0279	1 byte	Reserved
0290 - 029F	16 bytes	Hardware monitor
02A0 - 02A7	8 bytes	Reserved (T.P Serial Port)
02A8 - 02AF	8 bytes	Reserved (COM3)
02B0 - 02B7	8 bytes	Reserved (COM4)
02C0 - 02C7	8 bytes	Reserved (COM5)
02C8 - 02CF	8 bytes	Reserved (RS422/485 Port)
02F8 - 02FF	8 bytes	COM2
0388 - 038D	6 bytes	Reserved (FM synthesizer)
03B0 - 03BB	12 bytes	Video (Monochrome)
03C0 - 03DF	32 bytes	Video (VGA)
03F6	1 byte	Primary IDE
03F8 - 03FF	8 bytes	COM1
0400 - 04BF	191bytes	Reserved
04D0 - 04D1	2 bytes	Interrupt setting register (Edge/level triggered PIC)
0500 - 051F	32 bytes	Reserved
0800 - 088F	143 bytes	Reserved
0A79 - 0A79	1 byte	Reserved
0CF8 - 0CFF	4 bytes	PCI configuration register
0CF9	1 byte	Turbo and reset control register
4000 - 400F	16 byte	Reserved (RAS)

Interrupt Level List

Table 6.2.   Hardware Interrupt Levels (Factory Settings)

Type	8259	Priority	Description	Vector
NMI		High	-I/O CHK	02H
IRQ0	MASTER	↑	Timer 0	08H
IRQ1	"		System reserved	09H
IRQ2	"		Interrupt controller 2 (slave)	0AH
IRQ8	SLAVE		Real-time clock	70H
IRQ9	"		System reserved	71H
IRQ10	"		Not in use (Available for users)	72H
IRQ11	"		Not in use (Available for users)	73H
IRQ12	"		Not in use (Available for users)	74H
IRQ13	"		Co-processor	75H
IRQ14	"		Primary IDE	76H
IRQ15	"		Not in use (Available for users)	77H
IRQ3	MASTER		Serial port 2 (COM2)	0BH
IRQ4	"		Serial port 1 (COM1)	0CH
IRQ5	"		Not in use (Available for users) *1	0DH
IRQ6	"	↓	Not in use (Available for users)	0EH
IRQ7	"	Low	Not in use (Available for users)	0FH

*1   This device is reserved for future enhancement and currently unavailable.

POST Codes

Table 6.3.   POST Codes   *< 1 / 5 >*

POST (hex)	Description
CFh	Test CMOS R/W functionality.
C0h	Early chipset initialization: -Disable shadow RAM -Disable L2 cache (socket 7 or below) -Program basic chipset registers
C1h	Detect memory -Auto-detection of DRAM size, type and ECC. -Auto-detection of L2 cache (socket 7 or below)
C3h	Expand compressed BIOS code to DRAM
C5h	Call chipset hook to copy BIOS back to E000 & F000 shadow RAM.
0h1	Expand the Xgroup codes locating in physical address 1000:0
02h	Reserved
03h	Initial Superio_Early_Init switch.
04h	Reserved
05h	1. Blank out screen 2. Clear CMOS error flag
06h	Reserved
07h	Clear 8042 interface Initialize 8042 self-test
08h	Test special keyboard controller for Winbond 977 series Super I/O chips. Enable keyboard interface.
09h	Reserved
0Ah	Disable PS/2 mouse interface (optional). Auto detect ports for keyboard & mouse followed by a port & interface swap (optional). Reset keyboard for Winbond 977 series Super I/O chips.
0Bh	Reserved
0Ch	Reserved
0Dh	Reserved
0Eh	Test F000h segment shadow to see whether it is R/W-able or not. If test fails, keep beeping the speaker.
0Fh	Reserved
10h	Auto detects flash type to load appropriate flash R/W codes into the run time area in F000 for ESCD & DMI support.
11h	Reserved
12h	Use walking 1's algorithm to check out interface in CMOS circuitry. Also set real-time clock power status, and then check for override.
13h	Reserved
14h	Program chipset default values into chipset. Chipset default values are MODBINable by OEM customers.
15h	Reserved
16h	Initial Early_Init_Onboard_Generator switch.
17h	Reserved
18h	Detect CPU information including brand, SMI type (Cyrix or Intel®) and CPU level (586 or 686).
19h	Reserved
1Ah	Reserved
1Bh	Initial interrupts vector table. If no special specified, all H/W interrupts are directed to SPURIOUS_INT_HDLR & S/W interrupts to SPURIOUS_soft_HDLR.
1Ch	Reserved

Table 6.3.   POST Codes   < 2 / 5 >

POST (hex)	Description
1Dh	Initial EARLY_PM_INIT switch.
1Eh	Reserved
1Fh	Load keyboard matrix (notebook platform)
20h	Reserved
21h	HPM initialization (notebook platform)
22h	Reserved
23h	Check validity of RTC value: e.g. a value of 5Ah is an invalid value for RTC minute. Load CMOS settings into BIOS stack. If CMOS checksum fails, use default value instead. Prepare BIOS resource map for PCI & PnP use. If ESCD is valid, take into consideration of the ESCD's legacy information. Onboard clock generator initialization. Disable respective clock resource to empty PCI & DIMM slots. Early PCI initialization: -Enumerate PCI bus number -Assign memory & I/O resource -Search for a valid VGA device & VGA BIOS, and put it into C000:0.
24h	Reserved
25h	Reserved
26h	Reserved
27h	Initialize INT 09 buffer
28h	Reserved
29h	Program CPU internal MTRR (P6 & PII) for 0 - 640K memory address. Initialize the APIC for Pentium class CPU. Program early chipset according to CMOS setup. Example: onboard IDE controller. Measure CPU speed. Invoke video BIOS.
2Ah	Reserved
2Bh	Reserved
2Ch	Reserved
2Dh	Initialize multi-language Put information on screen display, including Award title, CPU type, CPU speed ….
2Eh	Reserved
2Fh	Reserved
30h	Reserved
31h	Reserved
32h	Reserved
33h	Reset keyboard except Winbond 977 series Super I/O chips.
34h	Reserved
35h	Reserved
36h	Reserved
37h	Reserved
38h	Reserved
39h	Reserved
3Ah	Reserved
3Bh	Reserved
3Ch	Test 8254
3Dh	Reserved
3Eh	Test 8259 interrupt mask bits for channel 1.

Table 6.3. POST Codes *< 3 / 5 >*

POST (hex)	Description
3Fh	Reserved
40h	Test 8259 interrupt mask bits for channel 2.
41h	Reserved
42h	Reserved
43h	Test 8259 functionality.
44h	Reserved
45h	Reserved
46h	Reserved
47h	Initialize EISA slot
48h	Reserved
49h	Calculate total memory by testing the last double word of each 64K page. Program writes allocation for AMD K5 CPU.
4Ah	Reserved
4Bh	Reserved
4Ch	Reserved
4Dh	Reserved
4Eh	Program MTRR of M1 CPU Initialize L2 cache for P6 class CPU & program CPU with proper cacheable range. Initialize the APIC for P6 class CPU. On MP platform, adjust the cacheable range to smaller one in case the cacheable ranges between each CPU are not identical.
4Fh	Reserved
50h	Initialize USB
51h	Reserved
52h	Test all memory (clear all extended memory to 0)
53h	Reserved
54h	Reserved
55h	Display number of processors (multi-processor platform)
56h	Reserved
57h	Display PnP logo Early ISA PnP initialization -Assign CSN to every ISA PnP device.
58h	Reserved
59h	Initialize the combined Trend Anti-Virus code.
5Ah	Reserved
5Bh	(Optional Feature) Show message for entering AWDFLASH.EXE from FDD (optional)
5Ch	Reserved
5Dh	Initialize Init_Onboard_Super_IO switch. Initialize Init_Onbaord_AUDIO switch.
5Eh	Reserved
5Fh	Reserved
60h	Okay to enter Setup utility; i.e. not until this POST stage can users enter the CMOS setup utility.
61h	Reserved
62h	Reserved
63h	Reserved
64h	Reserved
65h	Initialize PS/2 Mouse

Table 6.3. POST Codes < 4 / 5 >

POST (hex)	Description
66h	Reserved
67h	Prepare memory size information for function call: INT 15h ax=E820h
68h	Reserved
69h	Turn on L2 cache
6Ah	Reserved
6Bh	Program chipset registers according to items described in Setup & Auto-configuration table.
6Ch	Reserved
6Dh	1. Assign resources to all ISA PnP devices. 2. Auto assign ports to onboard COM ports if the corresponding item in Setup is set to "AUTO".
6Eh	Reserved
6Fh	1. Initialize floppy controller 2. Set up floppy related fields in 40:hardware.
70h	Reserved
71h	Reserved
72h	Reserved
73h	(Optional Feature) Enter AWDFLASH.EXE if : -AWDFLASH is found in floppy drive. -ALT+F2 is pressed
74h	Reserved
75h	Detect & install all IDE devices: HDD, LS120, ZIP, CDROM…..
76h	Reserved
77h	Detect serial ports & parallel ports.
78h	Reserved
79h	Reserved
7Ah	Detect & install co-processor
7Bh	Reserved
7Ch	Reserved
7Dh	Reserved
7Eh	Reserved
7Fh	Switch back to text mode if full screen logo is supported. -If errors occur, report errors & wait for keys -If no errors occur or F1 key is pressed to continue: ♦Clear EPA or customization logo.
80h	Reserved
81h	Reserved
82h	1. Call chipset power management hook. 2. Recover the text fond used by EPA logo (not for full screen logo) 3. If password is set, ask for password.
83h	Save all data in stack back to CMOS
84h	Initialize ISA PnP boot devices
85h	USB final Initialization NET PC: Build SYSID structure Switch S screen back to text mode Set up ACPI table at top of memory. Invoke ISA adapter ROMs Assign IRQs to PCI devices Initialize APM Clear noise of IRQs.

Table 6.3.　POST Codes　< 5 / 5 >

POST (hex)	Description
86h	Reserved
87h	Reserved
88h	Reserved
89h	Reserved
90h	Reserved
91h	Reserved
92h	Reserved
93h	Read HDD boot sector information for Trend Anti-Virus code
94h	Enable L2 cache Program boot up speed Chipset final initialization. Power management final initialization Clear screen & display summary table Program K6 write allocation Program P6 class write combining
95h	Program daylight saving Update keyboard LED & typematic rate
96h	Build MP table Build & update ESCD Set CMOS century to 20h or 19h Load CMOS time into DOS timer tick Build MSIRQ routing table.
FFh	Boot attempt (INT 19h)

COM I/O Address and Register Function

The following table lists the I/O addresses in case of COM 1.

Table 6.4.   I/O Address

I/O address	DLAB	Read/Write	Register	
03F8H	0	W	Transmitter holding register	THR
		R	Receive buffer register	RBR
	1	W	Divisor latch register (LSB)	DLL
03F9H	1	W	Divisor latch register (MSB)	DLM
	0	W	Interrupt enable register	IER
03FAH	X	R	Interrupt ID register	IIR
03FBH	X	W	Line control register	LCR
03FCH	X	W	Modem control register	MCR
03FDH	X	R	Line status register	LSR
03FEH	X	R	Modem status register	MSR
03FFH	X	R/W	Scratch register	SCR

DLAB (Divisor Latch Access Bit) : The value in bit 7 of the line control register.

Table 6.5.　Function of Each Register　< 1 / 4 >

I/O address	Description
03F8H	**THR: Transmitter Holding Register [DLAB=0]** D7　D6　D5　D4　D3　D2　D1　D0 bit7 MSB ← ｜ ｜ ｜ ｜ ｜ ｜ → bit0 LSB Register dedicated to write transmitted data to
03F8H	**RBR: Reciever Buffer Register [DLAB=O]** D7　D6　D5　D4　D3　D2　D1　D0 bit7 MSB ← ｜ ｜ ｜ ｜ ｜ ｜ → bit0 LSB Register dedicated to read received data from
03F8H	**DLL: Divisor Latch (LSB) [DLAB=1]** D7　D6　D5　D4　D3　D2　D1　D0 bit7 MSB ← ｜ ｜ ｜ ｜ ｜ ｜ → bit0 LSB Baud rate setting register (LSB)
03F9H	**DLH: Divisor Latch (MSB) [DLAB=1]** D7　D6　D5　D4　D3　D2　D1　D0 bit7 MSB ← ｜ ｜ ｜ ｜ ｜ ｜ → bit0 LSB Baud rate setting register (MSB)
03F9H	**IER: Interrupt Enable Register [DLAB=0]** D7　D6　D5　D4　D3　D2　D1　D0 0 ｜ 0 ｜ 0 ｜ 0 ｜ EMS ｜ ELSI ｜ ETHREI ｜ ERDAI Received data Interrupt enable Received data register empty Interrupt enable Receiver line status Interrupt enable Modem status interrupt enable [Always used at 0.] 1: Enable interrupt 0: Disable interrupt

Table 6.5.   Function of Each Register   < 2 / 4 >

I/O address	Description
03FAH	IIR : Interrupt Identification Register

D7 D6 D5 D4 D3 D2 D1 D0

| 0 | 0 | 0 | 0 | 0 | ←———→ | |

Interrupt details

1: Do not generate interrupts
0: Generate interrupts

bit2	bit1	bit0	Priority	Description
0	0	1	——	Interrupts are not generated.
1	1	0	1 (high)	Generated by overrun, parity, framing error or break interrupt. Cleared when the line status register is read.
1	0	0	2	Generated when the receive buffer register is ready. Cleared when the receiving buffer is read.
0	1	0	3	Generated when the transmitter holding register is empty. Cleared when the IIR is read or when transmitted data is written to THR.
0	0	0	4 (low)	Modem status interrupt is generated. (CTS, DSR, RI, CD) Cleared when the modem status register is read.

| 03FBH | LCR : Line Contror Regester |

D7 D6 D5 D4 D3 D2 D1 D0

D1	D0	Bit table
0	0	5
0	1	6
1	0	7
1	1	8

0 : 1 STOP bit
1 : 1.5 STOP bits at 5-bit length
    2 STOP bits at 6-, 7-, or 8-bit length

0 : Disable parity
1 : Enable parity

0 : Odd parity
1 : Even parity

0 : Disable stick parity
1 : Enable stick parity

0 : Break signal off
1 : Send break signal

DLAB (Divisor Latch Access Bit)
In order to access the divisor latch register, you need to set the bit to 1. To access another register, set the bit to 0.

Table 6.5. Function of Each Register *< 3 / 4 >*

I/O address	Description
03FCH	MCR: Modem Control Register D7 D6 D5 D4 D3 D2 D1 D0 | 0 | 0 | 0 | Loop | IRQ | X | RTS | DTR | DTR 0 : Inactive [HIGH] 1 : Active [LOW] RTS 0 : Inactive [HIGH] 1 : Active [LOW] Interrupt control bit 0 : Disable 1 : Enable Diagnostic local loop-back test 0 : Disable 1 : Enable
03FDH	LSR: Line Status Regester D7 D6 D5 D4 D3 D2 D1 D0 | 0 | TEMT | THRE | BI | FE | PE | OE | DR | Data ready (1 for existence of received data) Overrun error (1 for occurrence of an error) Parity error (1 for occurrence of an error) Framing error (1 for occurrence of an error) Break interrupt (1 for detection of break state) Transmitter holding register empty (1 for transmission buffer being empty) Transmitter empty (Set to 1 when both transmitter holding register and transmitter shift register are empty.)

Table 6.5.   Function of Each Register   *< 4 / 4 >*

I/O address	Description
03FEH	MSR : Modem Status Register D7 D6 D5 D4 D3 D2 D1 D0 | DCD | RI | DSR | CTS | DDCD | TERI | DDSR | DCTS | Delta CTS Delta DSR Trailing edge RI Delta data carrier detect CTS DSR RI DCD
03FFH	SCR : Scratchpad Register This is an 8-bit, readable/writable register which is available to the user to allow data to be saved temporarily.

Baud Rate Settings

A baud rate is set by software by dividing the clock input (1.8432MHz).　The baud rate in terms of hardware can be set to a maximum of 115,200 bps for SERIAL1, 2.　The baud rates available in practice depend on the operating environment (cable, software, etc.).　The table below lists typical baud rates and their respective values to be written to the divisor latch register (LSB, MSB).

Table 6.6.　Baud Rate Settings

Baud rate to be set	SERIAL1, 2 Clock input (1.8432MHz)	
	Value to be set in the divisor register (Decimal)	Setting error (%)
50	2304	---
75	1536	---
110	1047	0.026
134.5	857	0.058
150	768	---
300	384	---
600	192	---
1200	96	---
1800	64	---
2000	58	0.69
2400	48	---
3600	32	---
4800	24	---
7200	16	---
9600	12	---
14400	8	---
19200	6	---
28800	4	---
38400	3	---
57600	2	---
76800	---	---
115200	1	---
153600	---	---
230400	---	---

Example：To set 9,600 bps, write "00" to the (MSB) divisor latch register and "12 (decimal)" to the (LSB) divisor latch register.

Watch-Dog-Timer

The watchdog timer serves as a safeguard against possible system lock-up in your industrial computer system. In most industrial environments, there are heavy equipment, generators, high-voltage power lines, or power drops that have adverse effects on your computer system. For instance, when a power drop occurs, it could cause the CPU to come to a halt state or enter into an infinite loop, resulting in a system lock-up.

The application software created by user with the watchdog timer enabled, a RESET automatically generated unless the software periodically triggers the timer within the setting time-out interval. That is, while the system gets hung up, the running program can't trigger the timer periodically. The timer will generate a reset signal to reboot the system.

This feature allows a running program to restart in an orderly way when a power glitch or any abnormal condition occurs.

The watchdog timer comes with 255-level time-out interval, 1 - 255 seconds per interval, which can be adjusted by software setting. There is a tolerance of 2 second for this time-out interval. To maintain the normal system operation, trigger the timer periodically by the user-created program in consideration of the tolerance.

CONTEC's Web site [IPC-SLIB-01], which is bundled with this product, contains a sample program for the watchdog timer. To view the sample program for the watchdog timer, decompress "HWMandRTCut.zip", which is found under \RasUtility\Samples\Module.

Ex.) If the time-out interval is set to 30 seconds, the user-created program must retrigger the watchdog timer before 28 seconds will have elapsed in consideration of the tolerance. If the program failed to retrigger the timer (if 28 - 32 seconds have elapsed), the system will automatically reboot.

The I/O port is defined at address 2e/2fH. You can trigger/enable disable the timer by writing address 2e/2fH.

Here is an example for flow chart and programming how to use the watch-dog-timer.

(1) Example flow chart
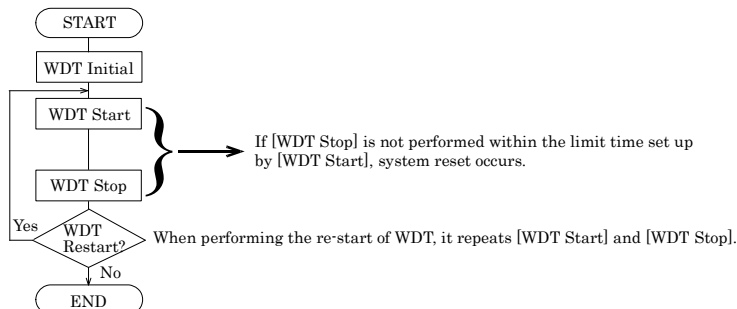
*   It is also possible not to perform [WDT Stop] instead of performing [WDT Stop] to [WDT Start], but to perform [WDT Start] continuously at the time of a re-start.

(2) Example programming

The following example is written in Intel8086 assembly language.

```
;===============
;<WDT Initial>
;===============
;----------------------------------------
;Enter the extended function mode
;----------------------------------------
MOV DX,2EH
MOV AL,87H
OUT DX,AL
OUT DX,AL
;----------------------------------
;Set WDT function at pin89
;----------------------------------
MOV DX,2EH
MOV AL,2BH
OUT DX,AL
MOV DX,2FH
MOV AL,0DH
OUT DX,AL
;----------------------------------------------
;Select logical device WDT(number 8)
;----------------------------------------------
MOV DX,2EH
MOV AL,07H
OUT DX,AL
MOV DX,2FH
MOV AL,08H
OUT DX,AL
;------------------------------------------------
;Activate logical device WDT(number 8)
;------------------------------------------------
MOV DX,2EH
MOV AL,30H
OUT DX,AL
MOV DX,2FH
MOV AL,01H
OUT DX,AL
;----------------------------------
;Set timer unit : second
;----------------------------------
MOV DX,2EH
MOV AL,F5H
OUT DX,AL
MOV DX,2FH
MOV AL,00H
OUT DX,AL
;----------------------------------------
;Exit the extended function mode
```

```
;----------------------------------------
MOV DX,2EH
MOV AL,AAH
OUT DX,AL


;=============================
;<WDT START : counter set and a start >
;=============================
;--------------------------------------------
;Enter the extended function mode
;--------------------------------------------
MOV DX,2EH
MOV AL,87H
OUT DX,AL
OUT DX,AL
;----------------------------------------------
;Select logical device WDT(number 8)
;----------------------------------------------
MOV DX,2EH
MOV AL,07H
OUT DX,AL
MOV DX,2FH
MOV AL,08H
OUT DX,AL
;----------------------------------------------------
;Set time of WDT and start to count down
;----------------------------------------------------
MOV DX,2EH
MOV AL,F6H
OUT DX,AL
MOV DX,2FH
;-------------------------------------------------------------------------------
;The data of an example is 15 seconds.(01H=1sec.- FFH=255sec.)
MOV AL,0FH      ; 0FH = 15Sec.
;-------------------------------------------------------------------------------
OUT DX,AL
;-----------------------------------
;Exit the extended function mode
;-----------------------------------
MOV DX,2EH
MOV AL,AAH
OUT DX,AL


;==============
;<WDT STOP>
;==============
;-----------------------------------
;Enter the extended function mode
;-----------------------------------
MOV DX,2EH
MOV AL,87H
```

```
    OUT DX,AL
    OUT DX,AL
    ;----------------------------------
    ;Select logical device WDT(number 8)
    ;----------------------------------
    MOV DX,2EH
    MOV AL,07H
    OUT DX,AL
    MOV DX,2FH
    MOV AL,08H
    OUT DX,AL
    ;----------------------------------
    ;Stop count down of WDT
    ;----------------------------------
    MOV DX,2EH
    MOV AL,F6H
    OUT DX,AL
    MOV DX,2FH
    ;----------------------------------
    ;The data of 00H is stop WDT
    MOV AL,00H
    ;----------------------------------
    OUT DX,AL
    ;----------------------------------
    ;Exit the extended function mode
    ;----------------------------------
    MOV DX,2EH
    MOV AL,AAH
    OUT DX,AL
```

⚠ CAUTION
The timer's intervals have a tolerance of ±2 seconds.

7. List of Options

AC adapter

- IPC-ACAP12-04   AC adapter (Input: 100-240VAC, Output: 12VDC 4A)

Bracket

- BX-BKT-VESA02   Bracket for VESA ("75 x 75", "100 x 100")

CF Card

- CF-1GB-A   1GB CompactFlash for Fix Disk
- CF-2GB-A   2GB CompactFlash for Fix Disk
- CF-4GB-A   4GB CompactFlash for Fix Disk
- CF-8GB-A   8GB CompactFlash for Fix Disk

TFT color liquid-crystal display

< LVDS&DVI input type >

- FPD-H71XT-DC1 *1   (15inch 1024 x 768 dots, Panel mounted type)
- FPD-L71ST-DC1 *1   (12.1inch 800 x 600 dots, Panel mounted type)
- FPD-S71VT-DC1 *1   (6.4 inch 640 x 480 dots, Panel mounted type)
- FPD-H75XT-DC1 *1   (15inch 1024 x 768 dots, Embedded type)
- FPD-L75ST-DC1 *1   (12.1inch 800 x 600 dots, Embedded type)
- FPD-M75VT-DC1 *1   (10.4inch 640 x 480 dots, Embedded type)

*1 Please purchase the optional connection cable [IPC-DVI/D-020, IPC-DVI/D-050].

< Analog RGB types >

- FPD-H21XT-AC   (15 inch 1024 x 768 dots, Panel mounted type)
- FPD-L21ST-AC   (12.1 inch 800 x 600 dots, Panel mounted type)
- FPD-M21VT-AC   (10.4 inch 640 x 480 dots, Panel mounted type)

Display cable only for DVI input

- IPC-DVI/D-020   DVI-D Cable (2m)
- IPC-DVI/D-050   DVI-D Cable (5m)

Cable for Cable Express *2

- CB-CE-1   Cable Express Cable (1m)
- CB-CE-3   Cable Express Cable (3m)

*2 This cable is for connecting to the CONTEC's expansion chassis of PCI Express Cable modes.
   The following enhancing chassis can be connected.
   ECH-PCI-CE-H2B, ECH-PCI-CE-F2B, ECH-PCI-CE-H4B, ECH-PCI-CE-F4B, ECH-PCI-CE-H4A, ECH-PCI-CE-H7A,
   ECH-PCI-CE-H13A, ECH-PE-CE-H2B, ECH-PE-CE-F2B

Cable for Analog I/O
Shield Cable with 96-Pin D-SUB Connector at One End

: PCA96PS-0.5P (0.5m)

: PCA96PS-1.5P (1.5m)

Shield Cable with 96-Pin Half-Pitch Connectors at Both Ends

: PCB96PS-0.5P (0.5m)

: PCB96PS-1.5P (1.5m)

Flat Cable with 96-Pin Half-Pitch Connectors at One End

: PCA96P-1.5 (1.5m)

Flat Cable with 96-Pin Half-Pitch Connectors at Both Ends

: PCB96P-1.5 (1.5m)

Half Pitch 96P Female Connector Set (5 Pieces)   : CN5-H96F

Cable for Digital I/O
Flat Cable with 37-Pin D-SUB Connectors at either Ends   : PCB37P-1.5 (1.5m)

: PCB37P-3 (3m)

: PCB37P-5 (5m)

Shield Cable with 37-pin D-SUB connectors at either ends

: PCB37PS-0.5P (0.5m)

: PCB37PS-1.5P (1.5m)

: PCB37PS-3P (3m)

: PCB37PS-5P (5m)

Flat Cable with 37-Pin D-SUB Connector at One End   : PCA37P-1.5 (1.5m)

: PCA37P-3 (3m)

: PCA37P-5 (5m)

Shield Cable with 37-Pin D-SUB Connector at One End   : PCA37PS-0.5P (0.5m)

: PCA37PS-1.5P (1.5m)

: PCA37PS-3P (3m)

: PCA37PS-5P (5m)

37-pin D-SUB (Male) Connector Set (5 Pieces)   : CN5-D37M

Cable for Counter Input
Shield Cable for CardBus Counter Input Card   : CNT-68M/50M (0.5m)

Shield Cable with Two 68-Pin Connector   : PCB68PS-0.5P (0.5m)
                                             : PCB68PS-1.5P (1.5m)

Shield Cable with One 68-Pin Connector   : PCA68PS-0.5P (0.5m)
                                             : PCA68PS-1.5P (1.5m)

Accessory for Analog I/O
Buffer Amplifier Box for Analog Input Boards (32ch type) : ATBA-32F *1*2

Terminal Unit for Cables (M2.5 x 96P)   : DTP-64(PC) *1

Screw Terminal Unit (M3 x 96P)   : EPD-96A *1 *3

Screw Terminal Unit (M3.5 x 96P)   : EPD-96 *1

BNC Terminal Unit (for analog input 32ch)   : ATP-32F *1

1 PCB96PS - optional cable is required separately (recommended length = 0.5m).

*2 External power supply is required (optional AC adapter POA200-20 is available.)

*3 "Spring-up" type terminal is used to prevent terminal screws from falling off.

Accessory for Digital I/O
Screw Terminal Unit (M3 x 37P)   : EPD-37A *1 *2
Screw Terminal Unit (M3.5 x 37P)   : EPD-37 *1
General Purpose Terminal (M3 x 37P)   : DTP-3A *1
Screw Terminal (M2.6 x 37P)   : DTP-4A *1
Signal Monitor / Output Accessory for Digital I/O (32P)   : CM-32(PC)E *1

*1 PCB37P or PCB37PS optional cable is required separately.

*2 "Spring-up" type terminal is used to prevent terminal screws from falling off.

Accessory for Counter Input
Differential/TTL input conversion terminal for counter input : CTP-4D *1
Screw Terminal Unit (M3 x 50P)   : EPD-50A *1 *3
Screw Terminal Unit (M3 x 68P)   : EPD-68A *2 *3

*1 CNT-68M/50M optional cable is required separately.

*2 PCB68PS-0.5P or PCB68PS-1.5P optional cable is required separately.

*3 "Spring-up" type terminal is used to prevent terminal screws from falling off.

CX100n Series
User's Manual
CX-100n-DC5311-C02